

Edited at the
Massachusetts Institute of Technology
December 1967, Price \$1

Congressman Daddario on Technology
Assessment



Technology Review

Kinetic Light as a Creative Medium
by Gyorgy Kepes



technology review

Published by MIT

This PDF is for your personal, non-commercial use only.
Distribution and use of this material are governed by copyright law.
For non-personal use, or to order multiple copies please email
permissions@technologyreview.com.

General Motors is people making better products for people.

Ben Bouier makes his mark of excellence with a brush.

Ben Bouier came to General Motors 13 years ago. As a janitor. He was soon a machine operator. He went to night school. Took electronics, engineering and drafting courses.

Today, he's a Graphic Illus-

trator at GM. His job: Helping set up the quality control standards of excellence followed by GM car divisions everywhere.

Ben Bouier is only one of many highly-skilled, self-made men who have made their mark at

GM by making the pursuit of perfection a way of life.

It's one of many good reasons why you will always find the Mark of Excellence on every Chevrolet, Pontiac, Oldsmobile, Buick and Cadillac car.

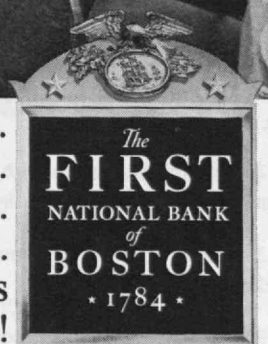
Benjamin H. Bouier, Jr., GM Manufacturing Development Staff, Warren, Michigan.



**"There's more to a bank than money—
that's why I went with The First Team."**



One Bank's money is as green as the next's. But there is a difference.
It lies in the quality of the thinking behind the transaction.
In the sophistication of the arrangements.
In the expertise of the execution and follow-through.
It costs your business no more to enjoy the invisible pluses
that mark the work of The First Team. Give us a call!



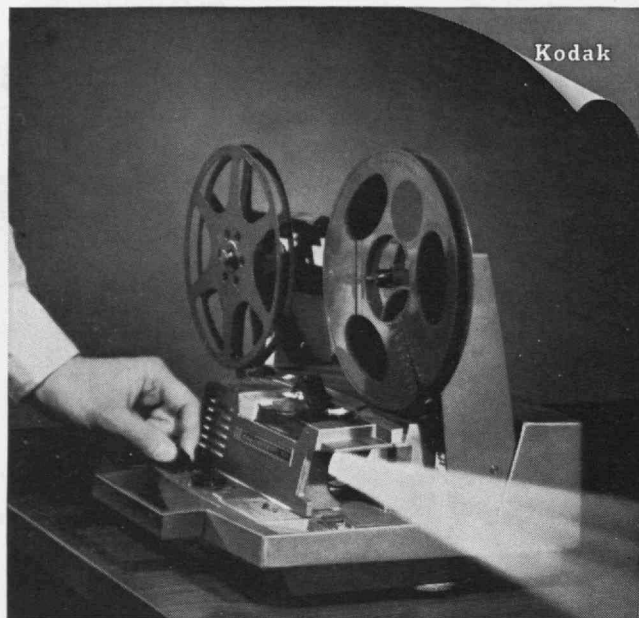
What kind of person dedicates his career to causes like this?



If you think you know, you may well be thinking in outmoded stereotypes. And if you happen to be a reasonably bright engineer yourself, the stereotypes could be hindering you.

A company that has ridden as continuously high as we have for the past 80 years can and must continually attract smart new people to join up. Smart people call their souls their own. At work they prefer to have other smart people both above them and below them.

The above-advertised projector, for example, represents the contribution of a certain Kodak engineer who is doing very well at figuring out new ways to manufacture new highs in performance into new possessions for the populace at new lows in cost. After working hours (which for him most weeks come to considerably more than 40), he has nourished his non-Kodak identity as follows:

1. For 16 of his 17 Kodak years has been serving as general manager (and bass chorister) of seven or eight concerts per year of oratorio music sung and played by professional musicians and a chorus of 300. Twelve successive annual Bach festivals included.
2. Committee service with half a dozen Rochester musical organizations that vie for audiences with the one he runs.
3. Music, theater, and movie critic for a pure highbrow FM radio station.
4. Owner and operator of a one-man cottage industry that manufactures neckties which sell well to the visual arts crowd.



 **Seven-speed gift idea** 
to extend the holiday feeling
over the whole year

With the KODAK INSTAMATIC® M95 Movie Projector you vary your show to suit your audience.

A seven-speed dial lets you choose super-fast, normal, or time-stretching slow-motion projection speeds. In forward or reverse. Plus stills.

So you can zip through some scenes. Linger over others. Switch to reverse for

instant replay. All at the twist of a dial to suit the interests and reactions of your audience.

The M95 shows super 8 or 8mm film with equal aplomb to give you the versatility of two projectors in one.

See your Kodak dealer. There's little time!

5. Secretary for 15 years of Dartmouth's Class of 1949.
6. Scaler of 45 of the 46 highest peaks in the Adirondacks.
7. Non-Ph.D. husband to a Ph.D. wife (who spent the past summer investigating Renaissance rhetoricians in the British Museum and the libraries of Italy as preparation for another year of teaching history at two colleges and keeping house for our friend and their three offspring).

On this page he has sacrificed some privacy of his own in the hope of attracting reinforcements and colleagues from among provocative engineers who have no objections to success and see it as many-faceted. Inquiries are invited. It is only fair to warn that the case cited here concerns a more traditional field for engineering than awaits some newcomers at Kodak. Many extremely important Kodak products, such as orbit the moon, are much less known to the general public than home movies and projectors.

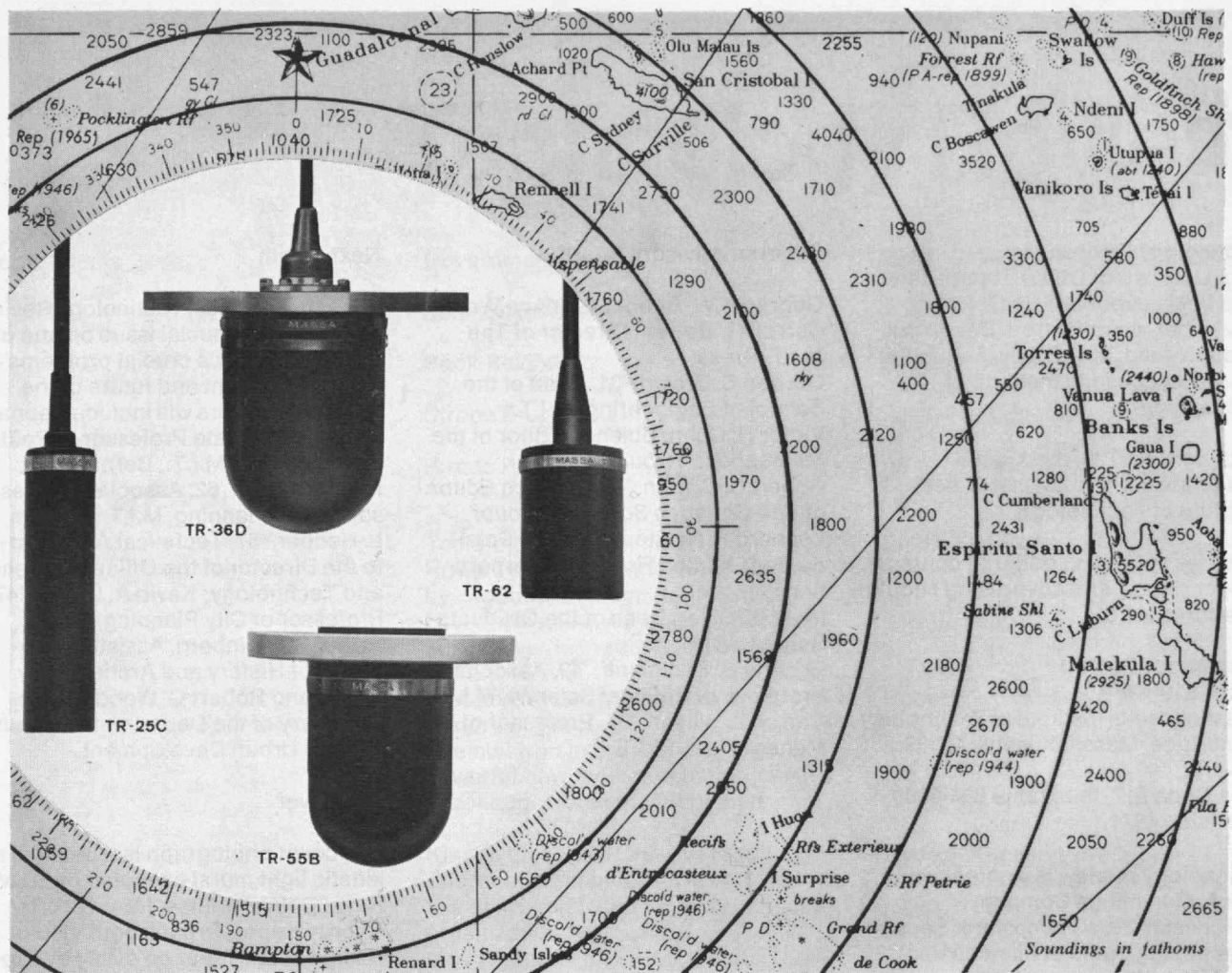
EASTMAN KODAK COMPANY

Business and Technical Personnel Department
Rochester, N.Y. 14650

An equal-opportunity employer offering mechanical, chemical, and industrial engineers a wide choice of personal opportunities in Rochester, N. Y.; Kingsport, Tenn., or Longview, Tex.

MASSA DIVISION

AND DEEP WATER SONAR TRANSDUCERS



In addition to hydroacoustic devices that operate just below the ocean's surface, Massa has introduced a wide range of deep water sonar transducers for use in exploration programs down to 20,000 feet. For example, the TR-55B was developed for use in transponder application to transmit and receive over the frequency range from 8 kHz to 16 kHz.

The TR-25C, TR-36D and TR-62 are general purpose transducers capable of generating medium power acoustic outputs in the 5-30 kHz region, operating at depths to 2,000 feet. Other Massa hydroacoustic devices operate from very low audio and sub-audio frequencies for use in acoustic mines to extremely high ultrasonic frequencies for use in detection of small objects.

Massa's specialized capabilities in the design and manufacture of underwater acoustic components, equipment and systems are available to government and industry. Write for catalog.

Equal Opportunity Employer



MASSA DIVISION
DYNAMICS CORPORATION OF AMERICA
 280 LINCOLN ST. HINGHAM, MASSACHUSETTS 02043



Technology Review, Reg. U.S. Patent Office, is published nine times each year (in October/November, monthly from December through June, and in July/August) at the Massachusetts Institute of Technology.

Copyright 1967 by the Alumni Association of the Massachusetts Institute of Technology.

Inquiries regarding editorial contents, subscriptions, and advertising should be addressed to:

Technology Review
Room E19-430
Massachusetts Institute of Technology
Cambridge, Massachusetts, 02139.

Area Code 617, telephone 864-6900, extension 4871.

Technology Review is printed by the Lew A. Cummings Company, Manchester, New Hampshire. Second class postage paid at Manchester, New Hampshire.

Price: \$1 per copy, \$7 per year in the United States, \$7.50 in Canada and foreign countries. Please allow three weeks for changes of address, and give both old and new addresses in all requests.

Donald P. Severance, '38, Publisher
John I. Mattill, Editor
Peter Gwynne, Managing Editor
Richard F. Wright, Advertising Manager
Ruth King, Associate Editor
Ralph Coburn, Art Director
Freda B. Rich, Alumni Editor
M. Dale Reeves, Production Manager
Margaret S. Goodhue, Advertising Assistant
John S. Pfeil, Jr., '43, Business Manager

Editorial Advisory Board

George A.W. Boehm, Science Writer
Carroll G. Bowen, Director of The M.I.T. Press
Gordon S. Brown, '31, Dean of the School of Engineering, M.I.T.
Victor H. Cohn, Science Editor of the *Minneapolis Tribune*
Robert C. Cowen, '49, Science Editor of *The Christian Science Monitor*
Leonard F. Newton, '49, Vice President of Opinion Research Corporation
Irwin W. Sizer, Dean of the Graduate School, M.I.T.
Eugene B. Skolnikoff, '49, Associate Professor of Political Science, M.I.T.
Carroll L. Wilson, '32, Professor of Management, M.I.T.

Next month

For January, 1968, Technology Review announces a special issue on one of modern society's crucial problems — the past, present and future of the city. Contributors will include Leonard J. Fein, Associate Professor of Political Science at M.I.T.; Bernard J. Frieden, Ph.D. '62, Associate Professor of City Planning, M.I.T.; William L. Hooper, '57, Technical Assistant to the Director of the Office of Science and Technology; Kevin A. Lynch, '47, Professor of City Planning, M.I.T.; Arthur R. Steinberg, Assistant Professor of History and Archaeology, M.I.T.; and Robert C. Wood, Under Secretary of the Department of Housing and Urban Development.

The cover

The cover photograph is a detail of a kinetic light mural executed for KLM Royal Dutch Airlines, New York, by Gyorgy Kepes, Professor of Visual Design at M.I.T. For an essay by Professor Kepes on the new interrelationship of art and technology which this art form represents, see page 25.

Technology Review

Departments

Government Review	Clyde C. Hall	6
Science Review	Robert C. Cowen, '49	8
Book Review	Joseph Mindel	10
Strobe Probe	Harold E. Edgerton, Sc.D. '31	61
Puzzle Review	Allan J. Gottlieb, '67	62

Articles

Technology Assessment How can we anticipate the unwanted by-products of technological discovery effectively enough to develop alternatives in the service of mankind?	Emilio Q. Daddario	15
Electron Microanalysis and the History of Art The electron microanalyzer is a powerful new tool for extending man's knowledge about the art of ages past	Robert E. Ogilvie, Sc.D. '55	21
Kinetic Light as a Creative Medium The kinetic luminous form and the use of artificial light for environmental organization represent a powerful new joining of art and science	Gyorgy Kepes	25
Cement: Foundation for an Expanding Economy The modern technology of cement is based upon new concepts for production, use, marketing, and management which are revolutionizing the industry	Henry N. McCarl, '62, and George H. K. Schenck	37

Trend of Affairs

Protein for the hungry	46
Government support for universities	
U.F.O.'s swept under the mat?	
Magnet in the blood	
Dust on the Moon?	
Tomorrow's engineer	
Reactors on the small scale	
Getting inside the driver's mind	
Organizational socialization	
Anti-environments	
Toward an ecological balance	

Institute Review

A confrontation on Vietnam, the President's annual report on the state of the Institute, and other news of the M.I.T. community's sundry concerns	54
---	----

Technology Assessment

Emilio Quincy Daddario (see page 15) is Chairman of the Subcommittee on Science, Research, and Development of the House Committee on Science and Astronautics. He is also a candid, straightaway sort of man who likes to get things out into the open where the clear light of understanding illumines deficiencies and thus suggests remedies. However, the roads he and his Congressional colleagues should travel as responsible public servants concerned with national policies for science and technology are obscure and he is not happy about it. And because there's a good slug of "take charge" in Daddario's makeup (developed, possibly, on Wesleyan's football field where earlier he was a brilliant star), he's getting lights installed along the dark roads—as indicated in his article elsewhere in this issue of the *Review*. The betting in Washington is that before he is through traffic will move much more smoothly over highways that lead to sound public policy.

At this fork-in-the-road juncture, however, there is some apprehension in the science-technology community about the direction Daddario plans to take in developing the design for his proposed Technology Assessment Board. What kind of institutional device will be established? Who will be the assessors? What will be the balance, among assessors, between scientists, economists, sociologists, lawyers, humanists? When will the assessment board be established—next month, next year?

Some indication of timing is given in Daddario's closing paragraph of the *Review* article: "I do not expect that a permanent technology assessment capability will develop quickly or from the efforts of our Committee alone. I do believe that the legislative branch of the government is the appropriate place for this important function to be established. To have the desired usefulness and stature, a period of careful concern for all ramifications is necessary. The participation of many thoughtful and informed persons will insure the evolution of an institution which should contribute greatly to the

well-being of man and his environment."

That statement should wash out any possibility that the board will be functioning soon. It won't. A better estimate of timing is found in another statement (available as a Committee Print) made this past summer by Daddario to his boss, George P. Miller, Chairman of the Committee on Science and Astronautics:

"... It is our intention to suggest to the Academies (of Science and Engineering), in their chartered role as an advisory group to the Congress, the formation of a working group from their membership. The group should have the following objectives:

"1. Arrange for pilot assessment projects. There are a number of contemporary issues in applied science and technology which call for assessment now. While gaining the immediate benefit of the results of a current appraisal we can also evaluate alternative methods of assessment. Further, different organizational arrangements can be compared. For example, the assessment task may be given to a specially formed committee, to a contract research organization, to a government agency, or to a professional technical society. The N.A.S.-N.A.E. working group might select a limited number of pilot assessment projects and performers which would yield a maximum of experiences on the assessment concept.

"2. The results of these assessments would be reported to the Congress for immediate incorporation into the decision-making process. But more importantly, the working group would evaluate the various approaches and performers, and report to the Congress the most efficient and useful techniques for an eventual permanent Technology Assessment apparatus. It is intended that the Academies' working group would be asked to participate in the concluding phases of the subcommittee study as recommendations and formulations are made to meet the congressional need."

All reliable indices here suggest that Daddario will very soon arrange some

sort of contractual relationship with the Academies, eliciting their professional counsel in designing a tighter plug for closing the gap in Congressional assessment capability. The Academies' study and eventual proposal are not likely to be concluded and presented before the end of 1968.

Human and Scientific Evaluations

A clear clue to the kinds of persons who will be chosen as assessors is found in the Daddario-to-Miller statement:

"The scientific and engineering community will have much to offer, for science by its very nature exposes its activities to trial and criticism. Technology assessment often requires experimentation for its own purposes. The analysis and interpretation of data on impacts and consequences is an extension of the scientific method. Although technology assessment must include many nontechnological factors, the bulk of the information must come from technical sources. Therefore, the government and private sector technologists will be called on for opinions and suggested operational assessment procedures.

"Other voices of society are also necessary, for we are interested in assessment in terms of human values as well as natural science statistics. The important role of social and economic indicators will be sought out by the subcommittee. These and aesthetic values which cannot be quantified are nevertheless part of the ultimate judgment of technological progress. The legislative process integrates the five value realms of science, economics, politics, society, and law. Our study will also elicit viewpoints from all of these sources."

Daddario gave further assurance that nonscience voices would be heard in the assessment process when early this fall he brought together a seminar of 10 scholars representing more humanistic disciplines. Their names, and particularly their titles, reflect what we may expect will be an essential part of the cumulative aid-to-judgment input that will characterize the future assessment board: Howard R. Bowen, President, University of Iowa; Lynton K. Caldwell, Department of Government, Indiana University;

A. Hunter Dupree, Historian, University of California, Berkeley; Marvin Kransberg, Department of Humanities and Social Studies, Case Institute of Technology; Milton Leitenberg, Scientific Director, Committee for Environmental Information, St. Louis; Emmanuel G. Masthena, Executive Director, Program on Technology and Society, Harvard University; Louis H. Mayo, Director, Program of Policy Studies in Science and Technology, George Washington University; Eugene B. Skolnikoff, '49, Department of Political Science, M.I.T.; Dael Wolfe, Publisher, *Science* Magazine, A.A.A.S.; and Christopher Wright, Director, Institute for the Study of Science in Human Affairs, Columbia University.

These men carried forward a heady day-and-a-half dialogue with Daddario and among themselves; some of its substance is reflected in these cursory notes about what Skolnikoff said: "We ought to talk more about the quality of life, and not so much about untoward technological difficulties presented by such problems as pollution, for example. Let's analyze gross trends—look at science and technology in international contexts. We should intervene when necessary in the developing technological process in order to achieve desirable social ends. I doubt that we can expect good predictions from biased scientists; we need others for a proper balance. Judgments of the scientific community in this kind of assessment are not reliable."

Toward This and Then Toward That

Finally, concerning the kind of institution that may be established, the seminar participants made many suggestions to Daddario—models such as the Council of Economic Advisers, the Smithsonian Institution, the General Accounting Office. Each, however, contemplated some sort of permanent establishment.

This seems to me not likely. It should be next to impossible to put together a fixed-personnel board whose members, no matter how well endowed with wisdom, could, as Daddario hopes, "provide the decision-makers with a list of future courses of action backed up by systematic analyses of consequences" on every request for support money. Thus, however permanent the *apparatus*,

assessors will more probably be convened on an *ad hoc* (very literally "toward this thing") basis, chosen for their long-time identification with and knowledge about the substance of the particular technological problem under immediate analysis.

Moreover, Daddario and his science-concerned colleagues on Capitol Hill have had available to them for the past three years a review group—the Science Policy Research Division (S.P.R.E.D.), Legislative Reference Service, Library of Congress. This little-known organization, which works close to the final decision-makers, is in a strategically influential position which derives from simple proximity. Congressmen and Congressional committees draw heavily upon its resources, and as a result S.P.R.E.D. is already taxed to the point which provoked Daddario to observe: "... the dependence which the Congress is beginning to place on this skilled organization makes its expansion in the near future a virtual necessity."

Hardly more than a score of persons work for S.P.R.E.D. today, directed by Charles S. Sheldon, 2d, an economist with wide experience in transportation and aeronautics. He is supported by six senior specialists: his assistant, Richard A. Carpenter, a chemist; Robert L. Chartrand, an information technologist; Warren H. Donnelly, whose competencies are in nuclear energy; George A. Doumani, specialist in earth sciences and oceanography; Frank Huddle, with wide experience in materials policy; and Freeman H. Quimby, a biologist. They are chosen rather more for the interdisciplinary breadth, than the disciplinary depth, of their knowledge, for objectivity, acceptability in their peer relationships, and for communicative ability.

S.P.R.E.D. is the uptown counterpart of O.S.T. (Office of Science and Technology) downtown, but it may well occupy a somewhat more powerful position in federal science-technology affairs because of its last-word counsel in respect of pending legislation. Whatever its considerable influence, S.P.R.E.D. is not the answer to Daddario's search for a more competent assessment capability. The institutional form that will finally meet

his approval—and the approval of his colleagues in Congress—is not likely to be known until the Academies of Science and Engineering have concluded their efforts to put flesh and bones on Daddario's skeletal concept of an assessment body "which will demonstrate to the electorate a confident and competent capability to create policies for the wise usage of technical knowledge."

Clyde C. Hall was formerly Public Information Officer of the National Science Foundation; he is now editing an information bulletin for the Council for the Advancement of Science Writing and the American Association for the Advancement of Science.

The Real Values of Basic Science

What's high-energy physics done for you lately? Put that bluntly, the question sounds absurd. Yet its crudeness emphasizes the disenchantment many politicians and their constituents now feel for the argument that basic science should be supported for eventual practical gain.

J. Herbert Hollomon, '40, former Under Secretary of Commerce and now President-Elect of the University of Oklahoma, stressed this last October in the Robert S. Williams Lectures at M.I.T. He said that disenchantment has as much to do with financial straits of government-supported science as such money-draining exigencies as the Vietnamese war. The financial pinch merely brings out congressional readiness to cut back science in favor of what it judges to be a greater need.

Dr. Hollomon said he is convinced that many congressmen and people generally are suspicious of the scientists. He added that scientists have oversold the notion that basic research fuels national prosperity and power.

This disenchantment is a fact of political life that the scientific community has yet fully to appreciate. It challenges that community to think through clearly what the real value of basic science is to society and to what extent it can compete for society's resources.

Maintaining Scientific Momentum

High-energy physics is a good case in point, for its advocates have already had to meet the challenge.

The study of matter's basic nature is remote from everyday life. Yet few would deny that, over the long-term future, it might uncover knowledge that would be as potentially practical as nuclear fission. In the words of the Nobel prizewinning physicist I. I. Rabi, "It is of blazing interest to physicists."

And it is increasingly expensive. To maintain research momentum, to penetrate farther and farther into the unknown, ever more powerful particle accelerators will be needed indefinitely.

The biggest machine in the world today, the 70-bev. (billion-electron-volt) accelerator at Serpukhov near Moscow has just started up. Yet the Russians are studying possible designs for a 1,000-bev. unit. In Europe, member countries of CERN (European Center for Nuclear Research) are deciding whether or not to build a 300-bev. machine.

In the United States, the Atomic Energy Commission plans to build a 200-bev. accelerator at Weston, Ill. Meanwhile, at the Brookhaven National Laboratory, physicists think ahead to a 600- to 1,000-bev. successor. The price tags read high. That on the Weston machine runs to \$375 to \$400 million plus some \$60 million a year in operating costs. And as the power goes up, so does the price.

Is the pursuit of the particles worth this continually rising cost? What really is its value to society? How far do physicists think they are likely to want to push to bigger, grander research tools? I put such questions to some of the Brookhaven staff and got back answers that typify the physicist's view.

R. Ronald Rau, Chairman of the Physics Department at Brookhaven, noted, "This is one of the two really fundamental frontiers in physics, the other being astrophysics." Maurice Goldhaber, Laboratory Director, observed that, "This is the kind of frontier you need to stretch the minds of young scientists to the limit."

Samuel J. Lindenbaum added the practical note. He explained, "In nuclear energy, we use only a small per cent of the energy of the proton. If you understood proton structure well enough, you might find a way to use much more of its energy. We can't predict this. But we can't rule it out."

He also explained why that research path seems indefinitely long. Physicists believe they must move to increasingly higher energy in bombarding one particle with another until they reach a level where moving still higher produces no new effects. Dr. Lindenbaum has carried out an experiment that puts that level high indeed.

According to relativity theory, no influence can travel faster than light in most instances. However, theory does not say whether or not this restriction holds for very small distances.

Physicists can use certain particle interactions to look for this kind of breakdown in the speed limit set by light. If these interactions go according to present particle theory, the restriction holds down to the smallest distances involved in the test. If it breaks down, then the experimenters would know that they had found a fundamental smallest distance below which influences could move faster than light—among other possibilities. As a rule, the higher the energy, the smaller is the smallest distance involved in such a test. Dr. Lindenbaum's group ran an experiment in which present theory holds down to a millionth of a billionth of a centimeter. His experience with this, he said, convinced him that physicists must use very much higher energies than are even envisioned today before they can expect to find a breakdown in theory such as he was looking for with Brookhaven's 33-bev. accelerator.

He believes that the 200-bev. machine at Weston won't even come close to such an interesting energy region. "I'm beginning to think that 200 bev., or even 1,000 bev., is not even 'high-energy' physics," he said. "It looks as though we may have to go to something like 20,000 bev. before we could expect to be in a region where things settle down, where even higher energies will not get us into a new realm of phenomena."

Physicists won't be satisfied with any accelerator, however elaborate and expensive, that doesn't get them into that region.

If the search is so indefinitely long, why should any one country, say the United States, have to match the accelerator power of others? Why not let someone else, say CERN, build the next big machine? What is the rush, when all basic knowledge will be freely published?

To the Brookhaven scientists, this is a matter of maintaining the strength of an important research field in one's own country, not of gaining an edge in

"They don't trust the scientists any more," said J. Herbert Hollomon, '40, in his 1967 Robert S. Williams Lectures at M.I.T. this fall. Science support by the U.S. government is jeopardized because American scientists oppose pork-barreling, Dr. Hollomon said, for while science has been sold on the basis of doing something for somebody it has in fact often failed to demonstrate such a cause-and-effect relationship.



knowledge. To Dr. Rau, "It's like a sport. If you always run second, interest flags."

To Dr. Goldhaber, "It doesn't matter if the pendulum swings so that now we have the hottest machine, then they have it. But if it remains too long, it is no longer a pendulum. Our best physicists would lose interest. Some would migrate."

A Cultural Justification for Understanding
In the view of the physicists, as typified by these comments, then, the subnuclear search should be supported because:

1. It is the most fundamental way scientists know to study nature;
2. And because of this it fires the imagination of budding physicists in the classroom;
3. It might have a practical payoff;
4. There is an element of international competition.

In Britain, where the cost squeeze pinches harder than in the United States, this view is considerably sharpened. The considerations of payoffs or competition are dismissed out of hand. J. M. Valentine, Secretary of the Rutherford High Energy Laboratory, remarked during a recent interview that citing vague future usefulness is no way to justify basic science. "The justification for high-energy physics is almost a cultural justification, not a practical one," he said.

The British have taken a hard look at that justification and have decided where to draw the line. As a member of CERN, they will share in the 300-bev. research facility if and when it is built. But, as far ahead as anyone now can see, there will be no big machine for Britain beyond the 7-bev. Rutherford accelerator. For work at home, British physicists are resigned to making do with this. And if this causes some of them to migrate, the general attitude seems to be "well then, let them migrate."

In the United States, the line is not so sharply drawn as a matter of government policy. Yet it exists at about the level of the Weston accelerator. And the physicists have helped mark it there, as some of them explained during a seminar at Columbia University where physicists and science writers discussed the subject informally.

Norman F. Ramsey, Higgins Professor of Physics at Harvard, who chaired a Presidential advisory panel on accelerators, ran through the several reasons for supporting particle research. He acknowledged that it does have a long-term practical promise. But when it comes to asking for large sums of money for such research today, he said, "In my opinion, the justification for high-energy physics should be the deeper understanding of matter."

He added that American physicists, recognizing this, have done considerable self-censorship. They have put aside many machine proposals that are worthwhile to ask for the Weston machine as the biggest single need in this field of physics.

David Z. Robinson, Vice President of

New York University, noted that, in doing this, physicists recognized that one of the most important considerations is that this kind of research is "part of the web of a whole scientific and technological educational system. One doesn't tamper with this lightly." The health of this system, he said, is a touchstone for helping decide how fast you move ahead in an important basic field. You wouldn't want to cut growth to the point of hampering the educational system.

With this in mind, and considering the over-all science budget, Dr. Robinson said physicists felt that to ask for a \$1 billion, 1,000-bev. machine would be "out of line. We now spend about \$150 million on high-energy physics," he explained. "The additional \$375 million for the machine over seven years seems reasonable. But \$1 billion would not."

Locating the 200-bev. machine in Weston with its segregated housing stirred up a political storm. But, in the main, Congress has bought the physicists' arguments. In formal studies for the White House and in congressional hearings, the physicists have built up a carefully reasoned case that does not lean on vague promises of future payoffs. They have recognized and help set priorities which limit what they would like to do in this field.

Because they were asking for an unusually expensive item, the physicists have already had to face the fact that you can no longer sell basic science on the assumption that the public agrees it is good. If Dr. Hollomon is right, and I think he is, many other fields of science will have to come to grips with this challenge too.

Robert C. Cowen, '49, is Science Editor of *The Christian Science Monitor*.

Book Review

Joseph Mindel

The Artisan As Hero

Legend and myth—one the beginning of history and the other of science—continue to serve a universal purpose long after the days of their origin. Ancient stories retold and reinterpreted become in language and in literature symbols for describing and exploring the nature of men and their worlds. Words—*marital*, *venereal*, *herculean*, *boreal*, *titanic*—acquire an evocative power that enhances their meaning. Legendary figures—Endymion, Pygmalion, Electra—provide themes and metaphoric frameworks for poets, playwrights, and novelists.

The Maze Maker (Holt, Rinehart and Winston, New York, 320 pp., \$6.95) is a novel about Daedalus, builder of the labyrinth in which the Minotaur was confined, and the first man to fly. The author, Michael Ayrton, an English painter, sculptor, and art historian, wrote the book, he has said, to free himself from a 10-year-long obsession with Daedalus. We have no way of knowing if he was successful, but it is clear that after 200 years, the Western mind is not yet free of the same obsession.

The Greeks saw Daedalus as the tool-maker, the fabricator of metals, the inventor of marvelous contrivances that made it possible for men to exercise a degree of control, and thus to live, in a universe subject to the unpredictable whims of the gods. He was the perfect artisan. As we tell the story, from a world transformed in two centuries by the machines and devices contrived by the descendants of Daedalus, the image is the same—he is the perfect artisan. But the meaning is not the same.

In the Boston Museum of Fine Arts there is a beautiful statuette of the Minoan period about 3,500 years ago, a Snake Goddess, delicately carved in ivory and gold by unknown hands. By an artist we would say, but the Greeks might well have attributed it to Daedalus. And why not? After all, Hephaestus, blacksmith of the gods, from whom Prometheus stole fire to give to men, had as wife—won by blackmail, it's true—Aphrodite goddess of love and beauty. While it is also true that she was far from a faithful

wife, the fact nevertheless remains that utility was married to beauty. To the Greeks, the artisan was an artist; not incidentally, but intrinsically, an artist.

Not so to us. Even the dictionary declares "Artisan: an artist; Obs." (The obsolescence must be relatively recent. The Renaissance artists were artisans; Leonardo's studio was a workshop.) We separate skill and technique from meaning and feeling, and we see Daedalus as half a man, forgetting that he would no more make an ugly bronze bowl than a leaky one. We respect him as technician, as builder, as engineer. We admire his ingenuity—how cleverly he succeeded in threading the spiral shell! We cannot refrain from constructing images of Daedalus, but they are inevitably distorted because they are reflections of the current obsession with technology. And therefore, looking as we do, with only one eye, we are uneasy in our admiration. How can an artisan, as we mean the word, be a hero?

Many find a less likely hero in Icarus, son of Daedalus, who flew too near the sun despite his father's warning. Curiously, one of those who so interpreted the myth was the noted British astronomer, Sir Arthur Eddington.

"Cautious Daedalus will apply his theories where he feels confident they will safely go; but by his excess of caution their hidden weaknesses remain undiscovered. Icarus will strain his theories to the breaking point till the weak joints gape. . . if he is destined not yet to reach the sun and solve finally the riddle of its constitution, we may at least hope to learn from his journey some hints to build a better machine."

With all respect, this is romantic nonsense that arises from imaginings unrestrained by reason. Daedalus was a craftsman. There were no "hidden weaknesses"; he knew, and explained to his son, the breaking point of feathered wings held together with wax. In exceeding the limits, Icarus defied natural law, the foreseeable consequence being death. Suicide may be pitiable or tragic, but it is difficult to see how it can be heroic.

All the same, a Sea was named for Icarus, though Daedalus was the one who flew.

Through the fictional Daedalus of *The Maze Maker*, Mr. Ayrton tries to explain Icarus. "I looked at Icarus, poised like a double axe against the declining sun, and saw him across the gulf forever fixed between man and hero. I, Daedalus, maker, watched my son begin to make his own death . . . watched my son make nothing out of nothing except his own destruction and this he contrived in so poetic and vainglorious a manner that his fame is deathless." But like other attempts, the explanation turns out to be only a restatement of the fact.

Icarus, living boy or dead hero, has a small part in the myth. The protagonist is Daedalus. In expanding and defining his role, Mr. Ayrton has taken liberties that are entirely acceptable in the context of the story he wishes to tell. Minos, for example, is a philosopher-king, rather than a warrior-king, who bears no animosity for Daedalus' share in the engendering of the Minotaur. Mythical events are explained in realistic terms. ". . . the myth which has evolved around our flight concerning wax and feathers," says Daedalus, "is entirely absurd." The wings, actually made of varnished animal bladders stretched on light wooden frames, were designed, not for flying like a pigeon, but for soaring and gliding on air currents.

The book provides an account, factually accurate as far as facts are available, of the life of Crete and the Greek world at the high point of the Bronze Age. Mr. Ayrton's apparently total immersion in the period, his own experiences as sculptor and metalworker, his descriptive skill, and his interpretive *tours de force* yield a picture of the time in rich, multidimensional detail.

But *The Maze Maker* fails in two ways.

First, it is not a novel. What matters, of course, is not placing it in the proper category, but that the breath of living people is lacking. There is only one character, Daedalus, full-formed from the beginning and hardly changed by the end. The pattern of flights and encounters

is soon evident; the symbol of the labyrinth (the Minotaur, the spiral shell, the maze of the mind, all of life as a labyrinth) is intellectually, but not poetically, valid. Scenes and actions serve, not to illuminate character, move the story, create tension, but to provide settings for descriptions of technical processes—smelting metals from ores, casting bronze by the lost wax method—or for irrelevant, though imaginative, variations on mythical themes.

The story is written as an autobiography, and Daedalus speaks directly to the reader across an acknowledged gap in space and time. But there is no communication in either direction. Not only do we remain uninvolved in Daedalus and the past, but the past, the world of Daedalus, throws no light on our world. How can it, when this other world has been re-created in our own image? And so the second failure of the book follows from Mr. Ayrton's failure to escape the pervading preconceptions of his time. His obsession, like the common obsession of the Twentieth Century, turns out to be not with the man Daedalus, but with the craftsman, the artificer, and therefore, ultimately, only with the products of his hands and not their human use.

We are trapped in a maze of our own making, with no hero in sight.

In Brief

Technology in Western Civilization (edited by Melvin Kranzberg and Carroll W. Fursell, Jr. New York: Oxford University Press, Vol. I, 802 pp., Vol. II, 772 pp., \$27.50) begins before mythology, in Eolithic times, and includes a photograph of Astronaut White's walk in space. Since the intention is to show the influence of technology on the course of civilization, technological developments are considered in the context of other aspects of society and culture. The treatment is extensive, rather than deep, each volume consisting of 45 short chapters. Volume I is largely chronological, ending with the late years of the Nineteenth Century. Volume II deals exclusively with such Twentieth Century problems as mass production, electronics and com-

munication, automation, space, and technology in war. A useful bibliography is provided and the index is adequate. It is worth noting that among the distinguished chapter authors are three members of the M.I.T. Faculty: Lynwood S. Bryant, Professor of History; Cyril S. Smith, Professor of Metallurgy and of the History of Science and Technology; and Robert S. Woodbury, '28, Professor of the History of Technology.

In 1912, Robert Cushman Murphy sailed on the whaler *Daisy* as assistant navigator, since there was no provision in a whaler's crew for a naturalist. For a year, while the *Daisy* hunted the sperm whale, he observed and took photographs. His account of the voyage appeared 20 years ago. His photographs, more than 50 years old, are now published, with explanatory captions, in a handsome book, *A Dead Whale or a Stove Boat* (Boston: Houghton Mifflin, 176 pp., \$8.50). Most of the pictures are remarkably clear, even many that have been greatly enlarged. At the time of the voyage, the author states, whaling was much the same as it had been for a century before. If so, the photographs will serve as ideal illustrations for *Moby Dick* at my next re-reading.

Joseph Mindel is a member of the M.I.T. Lincoln Laboratory; he was formerly Chairman of the Department of Science in the New York City public schools, and he is a frequent contributor of manuscripts for television documentaries.

New from the M.I.T. Community

Operations Research for Public Systems, Philip M. Morse, M.I.T. Professor of Physics, Editor. Cambridge and London: The M.I.T. Press, \$5. Papers presented at an M.I.T. Special Summer Program on the applications of operations research—also known as management science or systems analysis—in the area of public affairs. Included are projects in local government, urban planning, traffic and transportation, medical and hospital practice, and crime and criminal justice.

Grand Canyon of the Living Colorado, Jeffrey Ingram, '58. San Francisco: The Sierra Club, \$4.95 (paper) and \$7.50 (cloth). Chronicle of an adventure down the Colorado River through the Grand Canyon, emphasizing the controversy between conservationists and dam-builders in which the author has had a prominent role.

Economic Development in Communist Rumania, John M. Montias. Cambridge and London: The M.I.T. Press, \$15. The first book-length survey in English of Rumania's postwar economy, with sections on four major areas—industrial output and structure, agriculture, foreign trade, and Rumanian relations with other Eastern European countries.

Measurements in Mechanical Dynamics, David N. Keast, '53. New York: McGraw Hill Book Company, \$10.50. Background material on the use of electronic instruments for measuring and analyzing dynamic phenomena such as sound, vibration, mechanical shock and strain.

Threshold Logic, P. M. Lewis, Sc.D. '56, and C. L. Coates. New York: John Wiley and Sons, Inc., \$15. A view of threshold logic with emphasis on synthesis for prescribed sensitivity constraints; included are illustrative examples which demonstrate the use of the synthesis procedures in the design of circuits.

Systems Engineering Methods, Harold Chestnut, '39. New York: John Wiley and Sons, Inc., \$11.95. The practical methods and usefulness of a broad systems approach to solve engineering problems of ever-increasing complexity.

*It's one of the few frontiers still open
where imagination's all the capital you need.*



HERB STIER, University of Texas '57, with his wife Jo Ann and their two daughters during a visit in the San Antonio countryside. An Air Force veteran, Herb's also an avid golfer and Optimist—when he's not out setting new achievement records as a Mass Mutual agent!

Trust a Texan like Herb Stier to describe the life insurance business as a challenging new territory just waiting to be explored!

But Herb's a man who should know. After college, he spent seven years in retailing—then joined Mass Mutual in 1965. A single year later, he ended up with more individual life policies to his credit than any other man in the company! Total sales...\$1,789,974!

"It's a great business to be in," says Herb. You're on your own. You're selling a product that benefits the purchaser more than it does the seller. And you can be highly creative—you're free to put your own ideas, your own imagination to work where you think best.

"What's more, with Mass Mutual, you've got a great company behind you. You know, a lot of companies offer all kinds of help at the outset, but darned few are ready to commit the time and money that's really needed to get you on your feet. The people at Mass Mutual really put themselves out to make you successful.

"And let's not forget the personal rewards. Both my wife and I agree that we've found more in the way of friendship, pride of accomplishment, all-'round satisfaction than we'd ever have found elsewhere. Not to mention far greater financial success!

"If these are your goals, too, I'd suggest you write Mr. Charles H. Schaaff, President, Mass Mutual, Springfield, Massachusetts 01101. By the way, he started out as an agent himself!"



MASSACHUSETTS MUTUAL
LIFE INSURANCE COMPANY
SPRINGFIELD, MASSACHUSETTS • ORGANIZED 1851

Some of the Massachusetts Institute of Technology alumni in Massachusetts Mutual service:

Lyman L. Tremaine, C.L.U., '23, New York

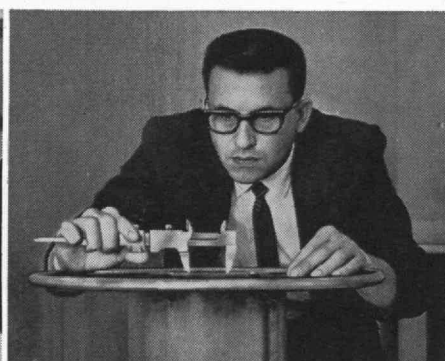
There is a growing need for nonferrous metals. To grow with it, contact Anaconda.



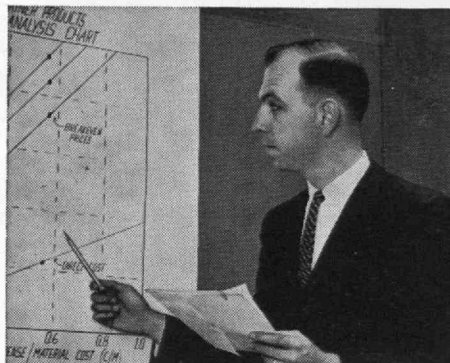
Robert Lindsay (BSME, U. of Kansas '64) is quality control supervisor of Anaconda Aluminum Company's plant in Louisville, Ky.



Joel Kocen (BS Commerce, Wash. & Lee '59; LLB, Wash. & Lee '61) left, is senior tax analyst at New York headquarters of Anaconda.



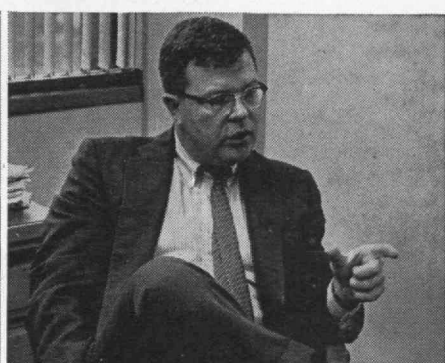
David Madalozzo (BSEE, Bradley '61) is plant engineer of the new Anaconda Wire and Cable Company mill in Tarboro, N.C.



Alvin Cassidy (BA Econ., Bellarmine '54; MBA, U. of Louisville '59) is director of financial planning of Anaconda Aluminum Company, Louisville, Ky.



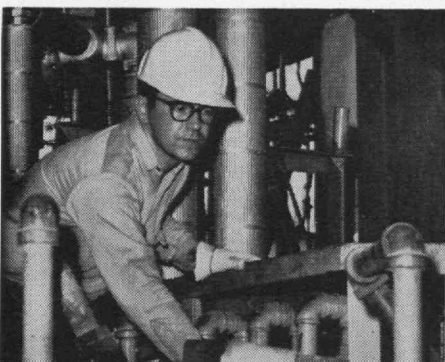
Robert Zwolinski (BSME, Rutgers '57) is chief mechanical engineer with Anaconda Wire and Cable Company, New York.



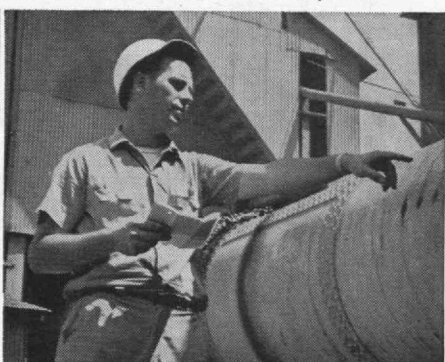
Willard Chamberlain (BE Metal. Eng., Yale '53) is manager of Anaconda American Brass Company's Valley Mills, Waterbury and Ansonia, Conn.



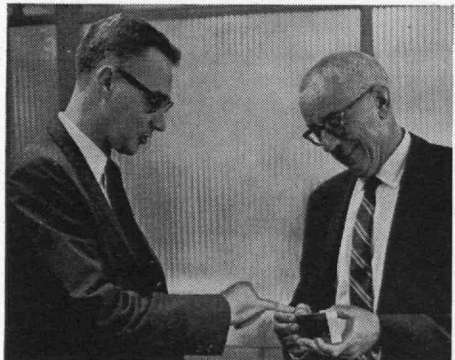
Robert Ingersoll (BS Geol., Montana Tech. '51; MS Geol., Montana Tech. '64) right, is senior geologist, Anaconda's mining operations, Butte, Mont.



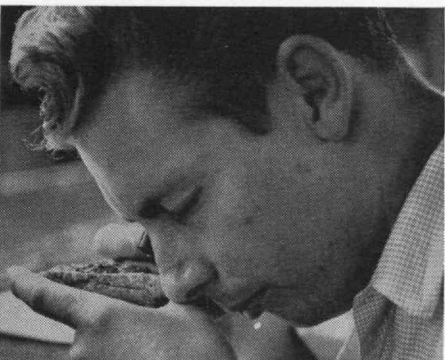
Thomas Tone (BS Mining, U. of Arizona '62) is foreman of the furnace dept. at the electrolytic copper refinery in Perth Amboy, N.J.



Richard Symonds (BS Metal., U. of Nevada '57) is superintendent of the lead plant at Anaconda's smelter in Tootoe, Utah.



Jay Bonnar (BS Met., M.I.T. '57; MS Ind. Mgmt., M.I.T. '62) left, is research administrator of Anaconda American Brass Company's research and technical center, Waterbury, Conn.



Wilson McCurry (BSc, Arizona State '64) is an assistant geologist in Anaconda's new mines dept., currently working on development of the Twin Buttes mine near Tucson, Ariz.



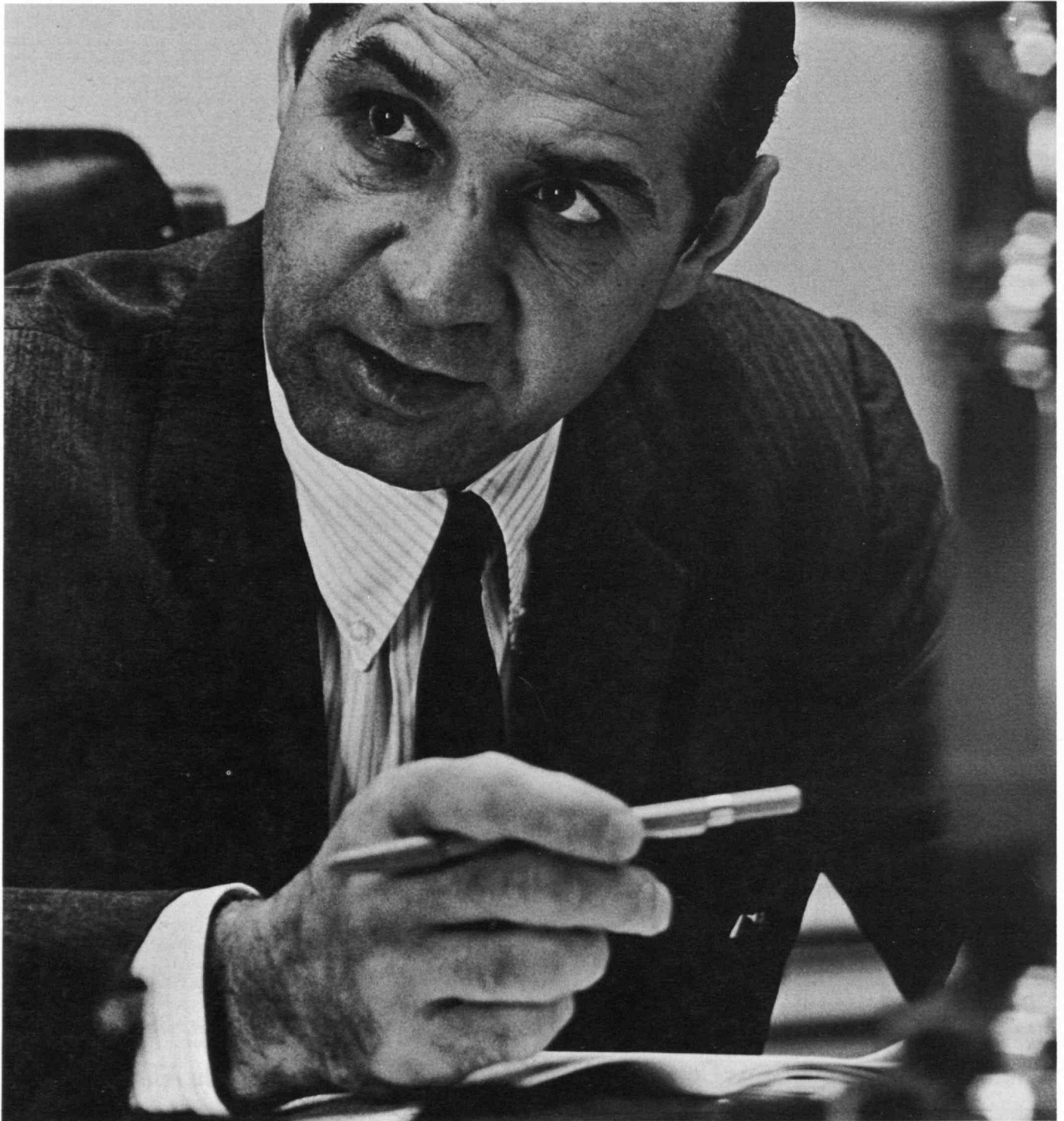
Terrence McNulty (BS Chem., Stanford '61; MS Metal., Montana Tech. '63; DSc Metal., Col. School of Mines '66) is senior research engineer, extractive metallurgical research, Tucson, Ariz.

Anaconda American Brass Co., Anaconda Wire & Cable Co., Anaconda Aluminum Co.

For information about your opportunity at Anaconda, write:

Director of Personnel, The Anaconda Co., 25 Broadway, New York, N.Y. 10004. Equal opportunity employer.

67122



The increasing involvement of technology in all facets of life demands efficient procedures for appraising its potential and assessing technological priorities.

Emilio Q. Daddario

Technology Assessment

The well-being of the thin shell of life and civilization on the earth's crust today seems to rest on the forge of applied science. This is a rather sobering matter—the source of dour and frightening predictions from some, the basis for hope and opportunity for others.

But despite the awesomeness of ecological, sociological, and economic effects, one central fact remains: it is still *man* who is making the decisions to deploy science and engineering resources. This imperative ingredient assures us that it is application and not technology per se which is the important focal point. At the same time, scientific knowledge has a certain momentum of its own—a pressure to be put to use. While it is difficult to plan the best uses of technology, it is even harder not to use it at all.

These aspects of the consequences and impacts of technology are integrated into most public policy issues today. We need to know a great deal more about technology, the capabilities which it gives us and the processes of its application and management. I use the term technology assessment to describe an evolving concept of research for the policy maker. Technology assessment is a systematic analysis of the alternatives available in using scientific and engineering knowledge in the service of mankind.

Technology Moves into the Political Arena

New technology and applied science have created needs for political, social, and economic adjustments which are often difficult to accept. It is this reiterative relationship of technology with other forces in our culture which makes it impossible to consider policies for science and engineering resources in any narrow context. The legislative process has already come to recognize this fact. The Congress is searching for improved means of informing itself for judgments on increasingly complex issues. A special organization performing technology assessment for the legislative branch may be the result.

In my opinion, legislators are already convinced of the “why” as far as technology assessment is concerned. In the past few years, the attitudes of the Congress toward science, research and development have changed profoundly. It was not too long ago that C. P. Snow’s description of “two cultures” was agonizingly accurate. Communication between layman policy makers and the technical community was superficial and infrequent. Both sides took their share of the blame for this: the scientist felt that he could not play in the political leagues without becoming tainted by the compromises and simplifications of the other participants, while the lawmakers feared entanglement in the complexities of detailed knowledge where instinctive judgment was of little use. Further, the security classification of military and atomic energy programs which comprised the bulk of federal research and development in the 1950’s provided a convenient excuse to avoid public positions on science policy issues. Lawmakers could accept or reject the recommendations of scientists without explaining or justifying their reasons to their constituents.

A number of events have changed this situation, to bring science policy directly into the middle ring of the legislative arena. The government has invested over \$100 billion in research and development in the past decade—expenditure which demands clear discussion of priorities and apportionment of resources. Pollution abatement, transportation, space exploration, and crime prevention—to say nothing of continued national security—are examples of recent public interests and needs which can be served by technology. No defense considerations prevent a full public airing of the pros and cons of research and development projects to solve most of these problems. And so the dialogue between technical and political cultures has gradually emerged from the small back rooms under such pressures.

Technology and the Congress

At the same time, the sources of science advice for the Congress have expanded. The Science and

Astronautics Committee of the House of Representatives formed a Subcommittee on Science, Research and Development in 1963 to increase the quality and quantity of information on the science content of public policy issues. In the past, the federal agencies, private sector contractors and special interest groups have acted as the main sources of information for Congress. But now we encourage inputs from professional technical societies, *ad hoc* and permanent advisory panels, the Smithsonian Institution, the National Academies of Science and Engineering and other groups. To provide an "in house" capability for the Congress, a Science Policy Research Division was established in the Legislative Reference Service of the Library of Congress. As a result of this multiplicity of information sources the level of understanding of science and technology in Congress has greatly increased.

Our Science and Astronautics Committee recently issued a report, "Science, Technology and Public Policy during the Eighty-Ninth Congress," which documents major government-science relationships over just the past two years. It provides explicit evidence that science, in its broadest terms, has become one of the largest, most powerful, and most important forces with which the Congress must deal. Science touches virtually every facet of our national endeavor, and indeed, almost every component of government policy and decision-making.

The report indicates that Congress does indeed recognize the impact of science and technology on modern society and is moving expeditiously to meet its challenge and shape its potential on behalf of human welfare. It is also clear that Congress is becoming aware of the difficulties and dangers which inevitably accompany applied science—and is searching for effective means to counter them.

In discussing problems of technology, the report states: "While the beneficial effects of science and technology as applied to national purposes and human needs have been well publicized, it is only recently that undesirable side effects are beginning to receive systematic attention. . . . The following technological matters with potential or presently undesirable side effects came before the 89th Congress: animal drugs, economic concentration in industry caused by technology, generation and distribution of electricity, invasion of privacy, noise, noise from aircraft, pollution, the population crisis, and technology and the American economy."

The report also documents the many pieces of legislation and lines of inquiry by which the Congress has sought to secure the benefits of technology. These diverse activities suggest that a sort of con-

tinuous assessment of technological potential—for good or bad—is going on in the legislative process. This is consistent with our responsibilities for authorization, appropriation and oversight.

Urgency of Assessment

On March 7, 1967, I introduced H. R. 6698 "to provide a method for identifying, assessing, publicizing, and dealing with the implications and effects of applied research and technology" by establishing a Technology Assessment Board. The bill recognized our need both for "identifying the potentials of applied research and technology and promoting ways and means to accomplish their transfer into practical use, and identifying the undesirable by-products and side effects of such applied research and technology in advance of their crystallization and informing the public of their potential in order that appropriate steps may be taken to eliminate or minimize them."

This bill was introduced primarily as a stimulant to discussion, and will, of course, be amended in the process. I have fortunately received many thoughtful comments, criticisms and suggestions on the Technology Assessment Board concept during the past few months, and I recognize the need to learn more about the "how" of technology assessment before we begin to build a permanent legislative mechanism.

A capability for technology assessment is needed now in a new, different and insistent way as contrasted to former times. Virtually all civilized activities depend heavily on technology. A progressive society is venturesome—willing to take risks in order to achieve potential benefits. New applications of science and engineering continually present attractive solutions to social, economic, and political problems and increasingly are requisite to the achievement of economic growth.

Technological change produces many and diverse effects—some recognizable before the fact, others not until later; some good and others bad; some measurable and others never clearly established in a cause-and-effect relationship. To maximize its standard of living, society needs to know as much as possible about these consequences of technological change.

Two new factors have made the assessment of technological alternatives more urgent. First, the increased world-wide population density (a result of technological advancements in itself) means that any technological activity is likely to affect a great many human beings. The large, widespread world population has made the maintenance of environmental quality and other aspects of the *status quo* vitally important today.

Meanwhile, the forces for change which are at the disposal of mankind are becoming very powerful. We are within reach of opportunities for human betterment which can alleviate the very basic problems of the world—war, hunger, disease and poverty. But this vast power has a corollary: biological, chemical, radiation, and energy effects are now available which can literally upset the so-called balance of the natural world. This means that unforeseen consequences are less likely to be confined locally, or detected under restricted conditions, where lessons can be learned before significant damage is done.

Historically, assessment has usually occurred well after the technology was introduced and when undesirable consequences had reached serious proportions. For example, the intensive cultivation of grasslands in the great plains precipitated dust storms and erosion during the drought of the 1930's. As a result, studies were organized and we learned the corrective action of windbreaks and other soil conservation measures—but too late to prevent hardships to the farmers involved.

Frequently, the call for assessment has come from inspired social critics and writers. Such was the case in environmental and human health hazards from pesticides. It was Rachel Carson's *Silent Spring* which brought to many people the realization that we had quickly accepted the value of certain chemicals in controlling pests without questioning the consequences of their widespread use to valuable insects, fish and wildlife.

Radical changes have often been made prior to any assessment of all potential consequences, and adverse conditions have as often resulted. The opening of the St. Lawrence Seaway allowed certain predatory oceanic eels to swim into the Great Lakes, much to the detriment of commercial and sport fishing. The rabbit in Australia and the giant African snail in the Pacific Islands are other poignant reminders of what happens when biological control mechanisms are bypassed or upended. On the positive side, sufficient knowledge of local conditions has opened the way to more fruitful changes and will continue to do so. Deliberate transfer of a plant or animal can be rewarding; the thought of a flowering plain where desert once stood is no longer a utopian dream.

The most dramatic example of drastic changes is the extinction of species. The great auk, the nearly extinct blue whale and the whooping crane have focused attention on a deadly trend—man's sacrifice of long-range objectives for short-term gains. Many animals are near extinction today because of man-induced changes to their natural environment. Their annihilation might well prove

more than an aesthetic and scientific loss. Life cycles could be disrupted and adverse side effects within the natural environment could carry over into the social and economic spheres of human beings.

Responsibility for Technology's Results

Technology assessment has been haphazard in the United States because we have never fixed the responsibility for the total results of technology. The market place is one institution for assessing technology. Beyond mere competitive performance of goods and services, commercial interests realize that *caveat emptor* is an unworkable doctrine. Legal recourse and public opinion as well as enlightened self-interest underlie the large amount of safety engineering and testing which goes on in connection with product development and fabrication in every manufacturing concern.

In some cases, such as acceptability of drugs, food additives and agricultural chemicals or the safe design and construction of automobiles, the government is assigning assessment functions to its agencies. For example, federal responsibility for assessment of nuclear technology is now well established. But at the same time programs lag in devising a long-term satisfactory disposal of reactor wastes. And the safety of nuclear power stations in the centers of cities has yet to be confidently demonstrated.

An example of a complex policy issue is the recent and continuing discussion of the sea-level canal between the Atlantic and Pacific Oceans. The Presidential Study Commission has reported that it is analyzing many complex political, military and economic problems related to the location, construction and operation of a sea-level canal. We should all be concerned that before any final decisions are made there will also be an adequate assessment of the environmental consequences of such an enormous geophysical project, for marine ecology certainly would feel the effects of the free passage of waters which has never occurred before.

These complex pros and cons are not sorted out by conventional appraisal processes. The market place does not take into account all the important values to society as a whole. Both the supplier and purchaser tend to accept short-term gains.

A single federal agency may have too narrow a mission assignment to provide adequate assessment of an entire technological system. For example, the environmental pollution problem is so fragmented among many agencies that abatement of a contamination of one type may simply shift the pollutant load to another part of the ecosystem. The manage-

ment of these activities has received critical attention, however, from Congress, among other bodies.

In the case of automation, we have been aware for at least a century that technology would displace man from labor. As long as there was more work to be done than skills available to do it, machines and automation caused only temporary dislocations. But today cybernation, or something like it, promises to eliminate virtually all repetitive physical and mental tasks performed by human beings. No existing market or government function is able to assess the impact of this revolutionary application of technology.

These deficiencies in current institutions and procedures are becoming subjects of discussion in the Congress, in universities, in professional technical societies, and in public policy foundations.

Recently the National Academy of Sciences prepared a report for our Committee entitled "Applied Science and Technological Progress." In discussing the ways in which nontechnical legislators and decision-makers can become informed about the consequences of technology, the report stated:

"... Congress should not attempt to second-guess the experts on technical appraisals, but it does have the responsibility to convince itself that the experts have asked themselves the right questions, especially concerning bottleneck problems. It is also important to be aware of certain common biases. For example, technologists already committed to a particular line of effort tend to be oversanguine, to minimize difficulties and underestimate costs. On the other hand, scientists often tend to be overconservative about technological developments and to call for more research. Often they underestimate the applicability of the science that they themselves have developed. There is a universal tendency to be overoptimistic about technical progress in the short run, but too conservative about the longer-range future.

"In appraising the situation, it is important for Congress to listen to the skeptics as well as the enthusiasts, and to ask the enthusiasts to answer the arguments of the skeptics. Laymen can learn a great deal from the confrontation of experts even when they do not understand the details. Especially in applied science and technology, priorities and goals can be established only through a multidimensional interaction between scientists, technologists, public servants, and the general public."

Opportunities and Pitfalls

Technology assessment could easily become a stifling influence on progress if it emphasizes the

dangers rather than the potentials for good. Our culture contains an innate conservatism which makes innovation difficult at the very best. History presents many familiar examples of the entrepreneur who was ridiculed and frustrated by a society which clung to the *status quo*. The inventor is usually quite alone with his vision.

On the other hand, those who propose radical ventures are often blinded by their enthusiasm. Or if they foresee a dark side to technology, they are loath to point it out, knowing too well how precarious acceptance of their scheme may be—and having a confidence that somehow the hazards will be minimized and the benefits realized.

A characteristic of America in the past century has been the love of the new, a boldness to try something different, the courage to take risks in applying the fruits of science. This attitude has been responsible for a great portion of our material welfare and strength among nations.

But now, with the immensity of consequences and the irreversible nature of many technological changes, we must couple our national propensity for risk-taking with a deeper assessment of both costs and benefits. We must continue to advance, yet remember that mere change is not equivalent to progress. We must not discourage the entrepreneur or the engineer; indeed, we must encourage the greatest degree of imagination in order to meet the problems of life and political existence. But this imagination must be extended to include the full assessment of all consequences without the fear that a reactionary society will seize on the risks and deficits as an excuse for stagnation.

There is, of course, an alternative new attitude: the call for a moratorium on science until society gains the wisdom to use technology safely. We are warned that mankind can know too much for its own good. A catch-up period is proposed, during which mores and rational conduct can develop which are equal to the choices forced by science. In the meantime, goes the familiar argument, a renaissance of art, literature and the humanities should be force-fed to redress the imbalance in our culture brought about by 20 years of unbridled research and development.

I do not believe that this line of reasoning appeals to many of us, particularly those who have observed the pain of disease, the tragedy of starvation abroad or the raw force of certain political subversions. Surely the nation and the world need more science, more knowledge of natural laws, and more prescience of what can and should result from the wise use of our resources. Science is concerned with truth, and, regardless of the shortcom-

ings of our civilization, we cannot be hurt by knowing more, much more, of what we are about. This is what technology assessment can mean.

No radical change is needed to strengthen the ability of the Congress to assess and judge technological programs. I take this view because, simply stated, technology assessment is a form of policy research which provides a balanced appraisal to the policy-maker. Ideally, it is a system to ask the right questions and obtain correct and timely answers. It identifies policy issues, assesses the impact of alternative courses of action and presents findings. It is a method of analysis that systematically appraises the nature, significance, status and merit of a technological program.

Assessment must be distinguished from technological forecasting and program planning. It is policy research—a balanced analysis of how a technological program could proceed with the benefits and risks of each policy alternative carefully described. It does incorporate prediction and planning, but only to expose the potential consequences of the program.

Technology assessment is an aid to, and not a substitute for, judgment. It provides the decision-maker with a list of future courses of action supported by systematic analysis of the consequences. There have been suggestions that the entire process of selection among technological alternatives be done within the technical community. But a legislative body cannot abdicate its responsibility in technical matters any more than it should in any others.

The scientific and engineering community will have much to offer, for science by its very nature exposes its activities to trial and criticism. The analysis and interpretation of data on impacts and consequences are an extension of the scientific method. Although technology assessment must include many nontechnological factors, for we are concerned with broad human values, the bulk of the information must come from technical sources.

The important role of social and economic indicators must also be sought out by the Congress. These and aesthetic values which cannot be quantified must nevertheless make their contributions to the ultimate judgment of technological progress, for the legislative process integrates five value realms—science, economics, politics, society and law.

I do not expect that a permanent technology assessment capability will develop quickly or from the efforts of our Committee alone. I do believe that the legislative branch of the government is the

appropriate place for this important function to be established. To have the desired usefulness and stature, a period of careful concern for all ramifications is necessary. The participation of many thoughtful and informed persons will insure the evolution of an institution which should contribute greatly to the well-being of man and his environment.

The Honorable Emilio Q. Daddario represents the First District (Hartford) of Connecticut in the United States House of Representatives. He is a member of the House Committee on Science and Aeronautics and Chairman of its Subcommittees on Patents and Scientific Inventions and on Science, Research and Development. Mr. Daddario studied at Wesleyan University and the University of Connecticut School of Law; he is a member of the Board of Regents of Wesleyan and of the University of Hartford.



Electron Microanalysis and the History of Art

The electron microanalyzer, a new scientific tool for the quantitative study of materials, has supplied research investigators with experimental data heretofore virtually unobtainable. It has found extensive use in all fields in which information is needed about chemistry on a small scale. Most of the applications have been in evaluating the homogeneity of materials on a micron scale (1 micron is 10^{-4} cm.), but many of the results have revealed that so-called homogeneous materials are not homogeneous after all.

The ability of the electron analyzer to deal with an extremely small amount of material makes it a very valuable tool for the analysis of art objects. Typically, it has been used to determine the composition of solder in jewelry and metal objects, to study the nature of corrosion products, and to determine the chemistry of glasses, ceramics and paint pigments. In special applications, particles on extraction replicas have been analyzed that weigh about 10^{-12} grams. But usually samples much larger than this may be taken for analysis without damage to the art object itself.

The Electron Microanalyzer

The instrument itself consists of an electron source, a "lens" to focus the electron beam, an x-ray spectrometer, and various scanning mechanisms. Together, the electron source and the lens generate a beam of electrons with energies of 30 KeV, which covers an area of 0.5 to 1 micron in diameter on the surface of the specimen. The incident electrons excite the elements in the irradiated area, and the excited atoms emit x-rays in a line spectrum unique

for each element. The wavelength of each characteristic line is measured in the x-ray spectrometer, and thus the particular elements present are identified. This simple analysis of lines present in the x-ray spectrum is called a " 2θ scan"; the detector may also be placed at a 2θ value, which corresponds to the position of a characteristic line of a particular element, and the specimen traversed under the beam to obtain a "line scan" showing how this one element is distributed.

A large fraction of the electrons in the original beam is backscattered from the specimen. These electrons, along with low-energy secondary electrons produced by the impact of the beam on atoms in the specimen, give useful clues to the shape of the specimen's surface. The signal from the backscatter electron detector modulates the brightness of a cathode-ray tube to give the impression of observing the specimen from the direction of the electron beam in a light shining from the position of the detector.

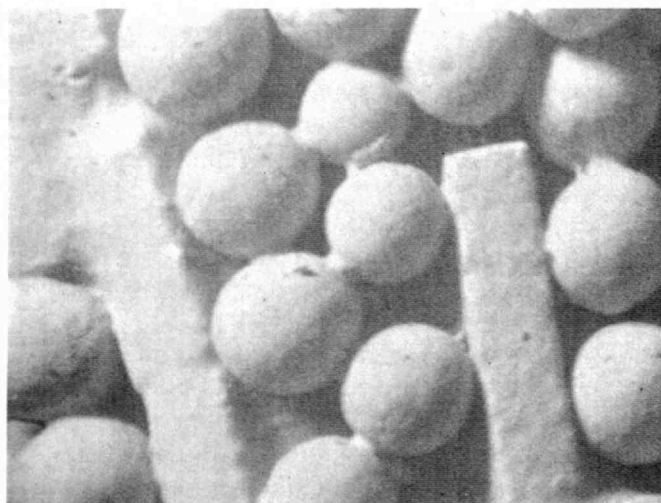
The signal from the x-ray detector can also be used to modulate the brightness of the cathode-ray tube, and this application is very useful for studying the segregation of elements in an alloy. In this case, the specimen is prepared so that there are no irregularities on the surface.

Analysis of Art Objects

Norman L. Peterson, '57 (Sc.D.'61) and I first applied electron microanalysis to art objects in 1959, analyzing a Fifteenth Century painting "Portrait of a Lady." We took core samples of paint from a variety

The Bersheh Sarcophagus is considered one of the notable treasures in Boston's Museum of Fine Arts; no other great painting from the Middle Kingdom is known. The electron microanalysis of the mineral pigments used by its painters was therefore of special interest. (Photo: Egyptian Expedition, Museum of Fine Arts, Boston)

Cyril S. Smith, Sc.D. '26, Professor of Metallurgy and of the History of Science and Technology at M.I.T., supplied the specimen of gold granulation which was examined by the scanning display in the electron microanalyzer. The depth of field is very large compared to that of a light microscope.



of areas with hypodermic needles. The needles were then mounted in bakelite and polished parallel to the axis of the needles to expose the various layers of paint (see *Technology Review*, Apr., 1960, p. 25). This method is only suitable when the paint layer is quite thick (0.1 to 0.5 mm.).

For thin paint layers we have found that an extremely small flake can be removed with a fine-pointed needle, and it was this latter technique that we used on the Bersheh sarcophagus.

Other art objects examined with the electron microanalyzer include a piece of Egyptian faience from about 2000 B.C., whose surface contained brown strips about 0.5 mm. wide. The analysis showed that

these brown strips were a potassium silicate with a small amount of iron and manganese which produced the color. Similarly, a piece of Egyptian sand-core glass from about 300 B.C. was found to contain a small amount of cobalt which was responsible for its blue color.

The Bersheh Sarcophagus

Near the village of Deir-el-Bersheh, on the east bank of the Nile about 175 miles south of Cairo, the Harvard University Museum of Fine Arts Egyptian Expedition of 1915 excavated a rock-cut tomb in which were found two painted wooden sarcophagi. The tomb had remained untouched for about 2,000 years, sealed by a fortunate rockslide soon after it was partially plundered by Romans. The paintings, on the inner surfaces of the sarcophagi (which are now in the collection of the Museum of Fine Arts, Boston), were remarkably well preserved, and so they provide an especially interesting opportunity for electron microanalysis. One sarcophagus in particular—that of Prince Dehuti-Nekht—is considered a supreme example of the ancient Egyptian painter's art, and it is from this artifact that came paint samples for electron microanalysis.

To make the analysis, paint samples were removed with a small needle and placed on a one-inch-diameter beryllium disk. The disk was then coated with a carbon film (about 500 Å thick) to make the surfaces of the paint sample conducting. We then put the disk into the probe and made 20 scans on each sample, with the results shown in the table at the right.

This table shows the results of electron microanalysis of the paint in the eight areas of the Bersheh Sarcophagus indicated in the picture. It reveals the elements and the compounds which the ancient Egyptians found useful as color pigments.

Color	Elements Found	Identification
Yellow	Arsenic	Arsenic tri sulfide
White	Calcium Chlorine trace Silicon trace Iron trace	Calcium carbonate
Blue	Calcium Silicon Copper trace	Copper-Sodium silicate
Red	Calcium Iron Silicon trace Chlorine trace	Iron oxide and calcium carbonate
Blue	Calcium Silicon Copper Iron trace Chlorine trace	Egyptian blue
Green	Calcium Silicon Copper Iron trace Chlorine trace	Copper meta borate
Pink	Calcium Silicon trace Iron trace Chlorine trace	Mixture of iron oxide and calcium carbonate
Yellow-Green	Copper Silicon Chlorine	

It is interesting to note that we expected the yellow pigment to be an arsenic sulfide, which would show a sulfur peak at a 2θ of 31.6° .

The absence of this line was quite disturbing; and the problem was resolved only after my daughter Claudia identified the material as a sulfide by x-ray diffraction using a Debye-Scherrer camera. It was found that the paint pigment did contain sulfur but that the specimen lost sulfur in the area of the incident electron beam so rapidly that none was detectable after about a five-minute exposure.

The calcium found in most of the specimens comes from a base coat of calcium carbonate. This was probably put on the surface of the wood to provide a good base for the paint.

The Bersheh sarcophagus is simply an example—admittedly of special interest because of its age and origin—of the usefulness of the electron microanalyzer to the study of paint pigments and indeed of all art objects in general. It is a simple and particularly striking example of how technology increases our understanding of human history and cultures.

Robert E. Ogilvie, Sc.D.'55, studied metallurgy at the University of Washington and later at M.I.T., where he has been a member of the Faculty since 1955. His publications have been in various applications of x-ray diffraction and electron microanalysis to metallurgy and materials problems.



A rich vocabulary of light art is emerging from new understanding of its form and new technology for its creation

Gyorgy Kepes

Kinetic Light as a Creative Medium

This is a belated report on an unrealized kinetic light design. There are three reasons behind my resurrecting this long-buried design idea. First, the growing interest today in using artificial light for artistic purposes. Recent years have seen a number of exhibitions of work by individual artists who have chosen light as their primary medium. Second, I believe that, in spite of the current vogue of light art, we have only begun to explore the rich potentials of the medium. The works done today, though extremely welcome and frequently exciting, are no more than the individual words—if not just the letters of the alphabet—of an emerging vocabulary of light art. They are hardly complete statements of artistic sensibilities. Third, I feel that the design principles and solutions of various problems of the subject design can be of use to the new generation of artists who have accepted artificial light as a creative medium.

For the original prompting to develop the following ideas almost 20 years ago I am thankful to the forward-looking engineers of the Sylvania Electric Company, who asked me to prepare some comments on the architectural role of illumination, color illumination in particular. My task was to make a critical evaluation of the existing situation as well as concrete suggestions for future exploration. They knew very well that they could not expect from me, a painter, expert comment on technical matters. The memorandum submitted in 1947 was a mixture of overcourageous projections for the future plus some concrete design ideas. No doubt the suggestions were technically innocent, but they were not inexpert in attending to the quality of the visual environment. Among the ideas suggested, two have bearing on this paper. One of these emphasized our kinetic needs in visual experiences; the other pleaded for an integration of illumination with the architectural whole.

Detail from a kinetic light mural for KLM Royal Dutch Airlines, New York, Gyorgy Kepes (1959).

The first suggestion read as follows:

"Recent research into the foundation of visual sensations indicates that the capacity of the visual sense is fed by renewed excitation and dulled by permanent excitation. The eye is never at rest, and its motion gives rise to a continuous resensitizing of the retina by renewing stimuli; but still the present frozen illumination does not give full play to the continuous renewed discharge of photochemical impulses of the eye. One is quite familiar with the persisting nature of the mobile color quality of a fire or a sunset; and in parts all natural sunlight is a continuous change of position and intensity in comparison with the fixed position and studied brightness of architectural illumination. The eye needs as much as any other organ a set of continuous gymnastics to retain its elasticity. Many means, such as *projected kinetic light forms*, might be suggested to supply this optical transformation and luminous change would become an important asset of the daily environment."

The other suggestion asked for integration of illumination with the total environment, to "rethink the entire issue of light sources, bulbs, and fixtures, and search for new technical solutions through which light will become a legitimate architectural element unified with structural units of walls, ceilings and, if necessary, floors. Luminous wall panels, screens and other prefabricated illumination elements could serve as essential light sources and could also fulfill space articulating and unifying structural functions.

In 1952 I was asked to carry these two key ideas, the kinetic luminous form and the use of artificial light, to physical realization and to develop a kinetic light space to demonstrate the validity of those principles.

It is difficult to present in words a never realized visual form, of course, but certain key factors that governed the design ideas can be discussed here. One was the acceptance of artificial

illumination as a legitimate medium of artistic expression. A second was the animation of space by continuous change of location, direction, and brightness of artificial lights. A third was the acceptance of randomness—that is, of nonmechanical process—as an important aspect of such kinetic design. The creative invocation of chance events was intended to avoid the deadening effect of cyclical repeats, a defect of all the early mechanically animated light mobiles. A fourth was the understanding that no single space form could be fully independent from its total spatial environment; a luminous kinetic form was no exception. Finally, and underlining all the previously listed considerations, was the realization that a complex artistic task of this kind could not be undertaken successfully without the acceptance of a new type of creative community: artists, scientists, and engineers all working together in intimate co-operation.

The physical features of the design reflected these considerations. The form was based on a wide range of available light tools and media: light sources ranging from incandescent to panelescent light and varying in shape, dimensions and brightness characteristics. Extended linear and point sources were used, with every possible emphasis and punctuation in terms of intensity and duration of illumination.

Those sources were to be placed in a variety of locations in the given environment; and, through controlled sequence of their activations, a richly animated space was to be created. In order to lend a sense of spontaneity to this kinetic play the following device was envisaged: a delicate opaque mobile was to be positioned between a screen made up of photoelectric cells and a strong light source aimed at the screen. A lamp of high thermal character was to be placed under the mobile so that the random air current generated by the heat would keep the mobile in continuous random movement. Random changes in the movement of the mobile, and, thus, in the shadows it cast, would, in turn, activate every compartment of the screen of

photoelectric cells. Since each of these cells was connected with light sources of specific character placed in different positions within the space, the created illumination was to appear and disappear, racing and jumping from wall to wall and from corner to corner. A further increase of variety and diversity of the effects was to be achieved on the one hand by dimmer, relays, and complex random circuitry, on the other hand by various light-reflecting or light-refracting devices—flat and curved metallic surfaces with different textures, mirrors, lenses, and prisms—each of them able to redirect, multiply, or filter light in some particular way. These explosive kinetic lights were to be contained within a legible architectonic setting or spatial volume. The basic intention was to create a luminous envelope that had no stationary dimension but still revealed a persistent space pattern as it fluctuated, pulsated, opened, and closed.

Three New Challenges to Artistic Vision

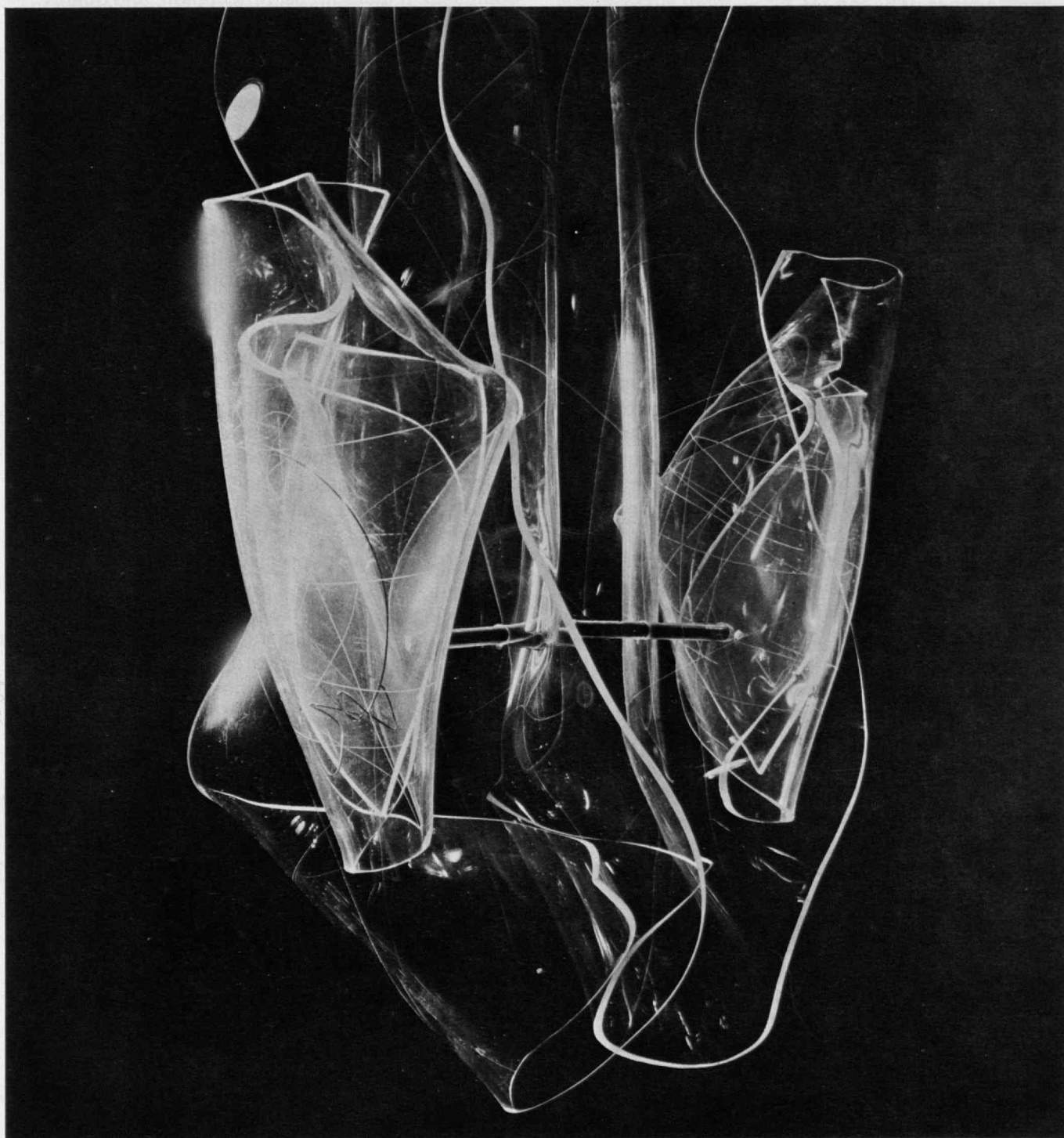
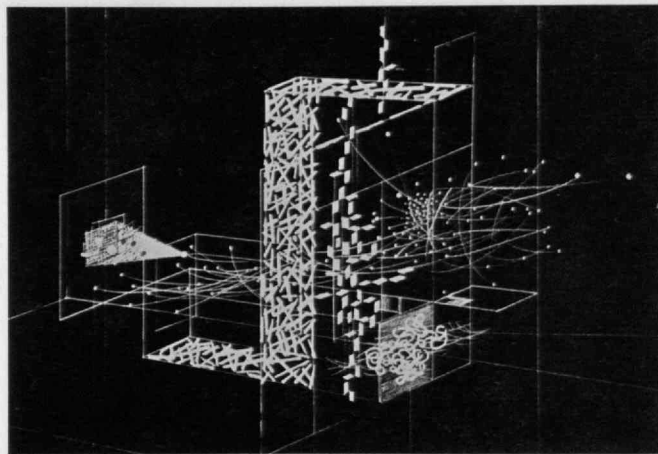
This account of an exploration of a new kind of artistic form affords me the opportunity to suggest some perspectives, both for understanding the past and for looking into the future, and may yield some useful further suggestions to those members of the younger generation who are searching for large-scale opportunities to utilize light as a creative tool. Kinetic light art on the scale of the whole environment has no actual, full-size physical examples. In this sense it does not yet exist. It does exist in another sense. It has been programmed; we know its genetic code, so to speak. For this authentic art of our own time has been gestating for the better part of a century, and, almost certainly, will be given birth within the very near future. The main outlines of a coherent picture of the major values generated during this long period of artistic search may begin to emerge from the tracing of the ancestry of this increasingly important art medium.

The arts of the Twentieth Century are too varied and complex to be amenable to a simple sociological or psychological explanation. Nevertheless, we can discern three basic aspects of our life that, seemingly, govern current trends in art. These are the new tools and media brought within the artist's reach by our rapidly advancing science and technology, the overwhelming man-created physical environment that envelops us, and the individual's struggle to find order, meaning, value, and identity in today's complex scientific world and urbanized society.

Of the many impressive tools and media that the new technology has given artists, artificial light is the richest in promise. It has contributed perhaps more than all other modern inventions to the transformation of daily life. Electric light has trans-

Design for a kinetic light space, Gyorgy Kepes (1952). (Photo: Willard J. Allphin, '25, Sylvania Electric Products Inc.)

Reflected form—molded plexiglas, Moholy-Nagy (1941).



formed our ways of living, not only by dissolving the boundaries between our days and nights but also by enabling us to lay embracing networks of transportation and communication: without the aid of artificial illumination, traffic could not flow in our city streets, airplanes could not fly, nor could motion pictures be made, projected, and telecast.

Beyond this, artificial illumination has potent aesthetic implications. That exploration, however, has hardly begun, for it has taken a long time to discover the hidden opportunities and find the idioms that artificial light offers. The incursion of artificial light into our visual environment puzzled and troubled some Nineteenth Century giants of the visual realm. Paul Cezanne, the father figure of a generation of artists, had only negative comments. In a letter written to his niece, Miss Paule Conil, on September 1, 1902, he remarked: "I remember very well Establons and the once beautiful picturesque banks of L'Estaque. Unfortunately, what we call progress is nothing but the invasion of the two-legged, who has no peace until he transforms everything into horrible alleys of gas lights and, what is still more terrible, of electric lights. In what times we live!"

It took a great scientist to project a braver, affirmative vision. In the same year, A. A. Michelson, the first American scientist to receive the Nobel prize, envisioned a future dynamic art based upon artificial light. In *Light Waves and Their Uses*, he wrote: "Indeed, so strongly do these color phenomena appeal to me that I venture to predict that in the not very distant future there may be a color art analogous to the art of sound—a *color music*, in which the performer, seated before a literally chromatic scale, can play the colors of the spectrum in any succession or combination, flashing on a screen all possible gradation of color, simultaneously or in any desired succession, producing at will the most delicate and subtle modulations of light and color, or the most gorgeous and startling contrasts and color chords! It seems to me that we have here at least a possibility of rendering

all the fancies, moods, and emotions of the human mind as in the older art."

But many years had to pass before artists would dare to use mobile artificial light as a legitimate creative tool and touch it with confidence.

The second major factor to stimulate and challenge artistic vision was the complexity and dynamism of our urban-industrial environment. The Twentieth Century megalopolis, overwhelming in its scale and kinetic power, formless and evasive in its growth, is begging for a new vision that can domesticate and order its dynamic perspectives. Exciting and confusing, it lacks focus, articulation, and quality.

It surrounds its inhabitants with a stimulating optical panorama of ever-changing textures, but devours the contours of legible shapes and forms. A great figure of Twentieth Century architecture, Frank Lloyd Wright, found this overwhelming world corrosive and menacing in its implications for humanity. But there were artists and architects who could detect in the chaotic, aggressive man-created environment a promise of a richer and sounder future. They assumed that, through understanding the underlying nature of those merging vistas that impressed them so deeply, they could find the knowledge they needed to guide its growth. The two aspects of the environment offering the greatest challenge to their imagination were its overwhelming dynamics and its rational structure. The first was the world of speed and power, of bustling streets, motor cars, airplanes, and the muscular workings of factories. The other was the new materials and structural principles, which asked for clarity, economy, and transparent precision in their use. Sant'Elia, a visionary of Twentieth Century architecture, proclaimed in 1914: "We must invent and rebuild the futurist city along lines similar to those of a boundless shipyard, active, crowded, bustling, dynamic, in which the individual edifice fits like some huge piece of machinery."

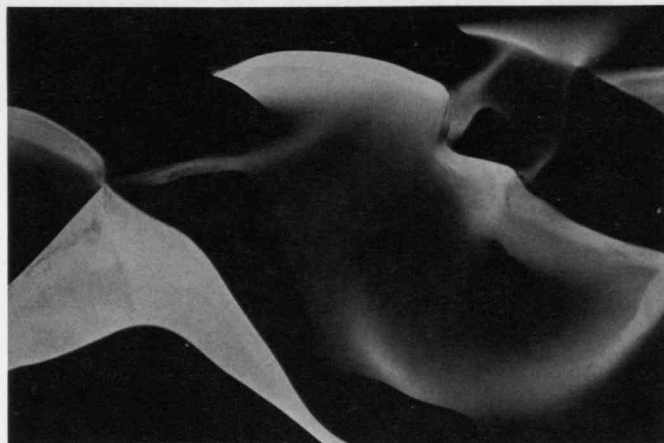
If there exist any cumulative, persisting artistic values in the Twentieth Century, they are dynamism and structural honesty. Structural clarity—the stern renunciation of illusion—and dynamism came to be seen as artistic imperatives in other creative fields also, for example, in the new theatre of Erwin Piscator and Bertolt Brecht. To them, the theatre was the theatre, not the image of something else, some other place, some other time. In Brecht's own words: "It is more important nowadays for the set to tell the spectator he's in a theatre than to tell him he's in, say, Aulis. The theatre must acquire *qua* theatre the same fascinating reality as the sporting arena during a boxing match. The best thing is to show the machinery, the ropes and the flies.

"There is a point in showing the light apparatus openly, as it is one of the means of preventing an unwanted element of illusion; it scarcely disturbs the necessary concentration. . . . No one would expect the lighting to be hidden at a sporting event, a boxing match for instance."

The third contemporary condition governing creative vision is the inevitable inner struggle of the individual to find his identity without surrendering his hold on modern life. Not too long ago, the useful guides for human conduct seemed to have gone forever. The individual had lost confidence in himself, mistrusting his ability to grasp his world according to his understanding and thus shape it. He renounced his broad responsibilities to the community and recoiled to his intimate interior world.

This attitude of some modern artists was expressed in a manifesto published in 1932 and signed by, among others, Jean Arp, Samuel Becket, and J. J. Sweeney. Its opening words were: "In a world ruled by the hypnosis of positivism, we proclaim the anonymity of the poetic vision, the hegemony of the inner life over the outer life. We reject the postulate that the creative personality is a mere factor in the pragmatic conception of progress, and that its function is the delineation of a vitalistic world."

The seat of this poetic inner world was the unconscious. To penetrate that well-protected region the artist had to invent a variety of devices. Accidental and chance events were introduced to trigger deeper poetic responses. Joan Miro, for instance, spilled paint on paper and let it run. The shapes that emerged became pathways to his own inner mythology of private shapes. Those chance events pregnant with unconscious meanings were, thus, set between two conscious acts that gave them shape. One was the initial decision to evoke chance processes, the other the terminal decision to stop them. Entering through these gates, the artist left the world of named, formed, and classified things and reached down to the unnamed, unformed



events of his inner world. He hoped to escape from the anonymous beast of Twentieth Century life, the arrogant self-confidence of one-sided rationalism; the inner world seemed to offer moments of freedom and dignity. But this oasis of poetry could not be reached by using dishonest guides. The circus of self-display froze spontaneity, chained freedom, and killed dignity. But, in spite of some abortive attempts, the genuine core of artists' intentions touched upon the most crucial aspects of our contemporary need. They pointed to something missing, something about which we all dream: the freedom that comes from the spontaneity of chance events that we so much appreciate in the forms of nature. These qualities, discovered in the imaginative process and expressed in visible, tangible artistic forms, could become valuable guides for reshaping our ever more complex inner and outer world. They could evoke experiences with qualities both of life and of order and, thus, serve as the inner compasses needed in mapping out new territories.

Great scientists and great artists, in some of their lucky moments, were able to make use of the spontaneity of chance events in unlocking imprisoned imaginative power. Some of the greatest masters of East and West, in their old age, came to recognize that there are greater masters within than disciplined knowledge and consciously willed goals. Only by standing back humbly and letting these real masters take over sometimes can, on a new higher level, man and nature meet. To quote Arp once more: "Works of art should remain as anonymous in the great workshop of nature as are the clouds, the mountains, the seas, animals, and man himself. Yes! Man should remain as anonymous in the great workshop of nature as are the clouds, the mountains, the seas, animals, and man himself."

New Tools and New Media

Nature's workshop is an ecological community. Each form, each pattern is produced through the interaction of the whole community. Forms shape

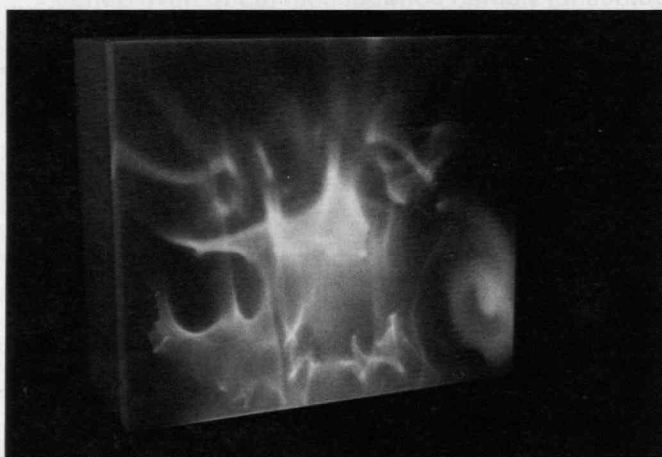
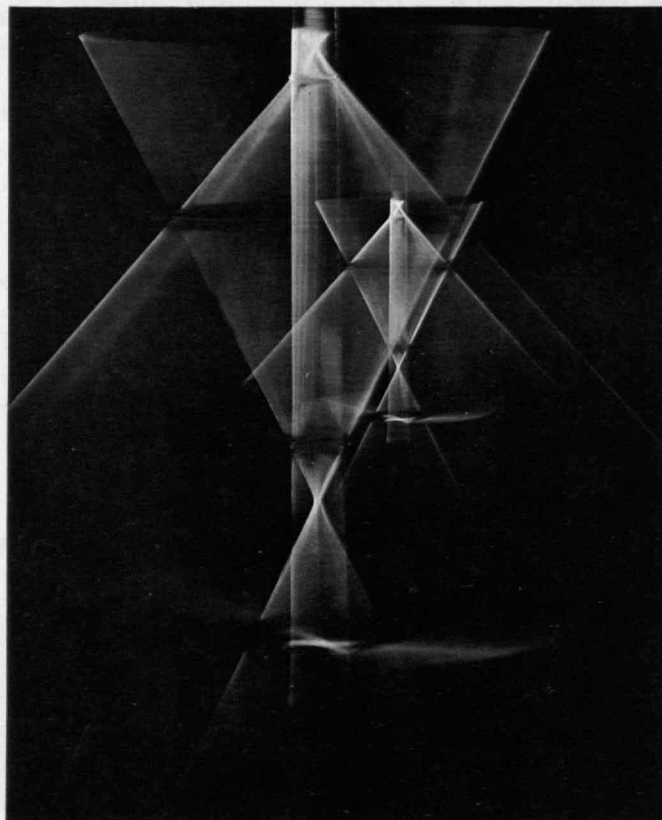
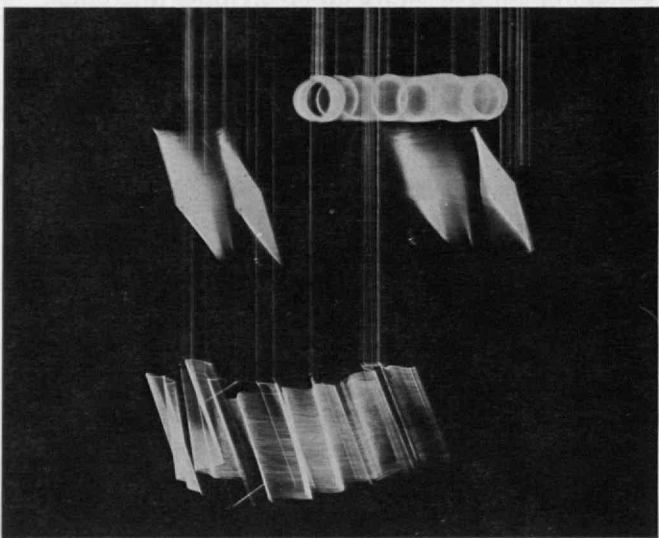
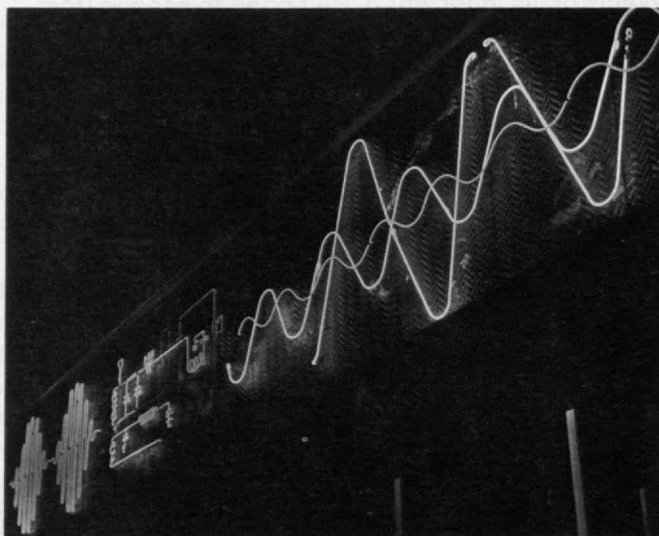
Outdoor mural, Gyorgy Kepes (1951).

Photograph—virtual light volumes, Theodore M. Brown, '53 (1952).

Light projection on photosensitive emulsion, Franklyn Williams, '59, and Michael Flint (1959).

Luminor, Earl M. Reiback, '56 (1966). (Photo: Howard Wise Gallery.)

Photograph—geometrical pattern reflected in a curved metal surface, Gyorgy Kepes (1940).



forms; events provoke events, defining one another's contours, paths, rhythm, and fate. To find the way to higher creative achievements, man has to accept and understand the ecological laws of his own creative life. For his abilities, his efforts, and his knowledge are, to a great extent, shaped by the knowledge and insights of the total creative community. Today more than ever collective work implies not merely teams formed from a single intellectual discipline, but the interplay of knowledge and insights of many fields. In the world of nature, the shape, size, strength, and life span of a tree depend upon many things: on the genetic character of the original seed, on rain and sunshine, on the fertility of the ground, on the shadows of fellow trees, on all features of the ecological fabric. So, in the artists' creative world, the depth and strength of an artistic form depends upon the interplay of artistic tradition, personal confrontations, social and physical environment, deep-seated individual needs, knowledge of tools and media, and a cognitive horizon that includes the major landmarks of contemporary scientific knowledge.

Artists, engineers, and scientists can be key members of interacting creative teams. But such teams are hardly yet in existence, for their need is not yet recognized or respected. Their acceptance and realization presupposes a new scale and character of artistic goals. Only some few rare artists have sensed a future for a unified collective vision that can see in terms of all-embracing aesthetic construction. Piet Mondrian was one of them. He dreamed about a remote, but still real, future stage of art in which paintings, sculptures, and other forms of plastic art would be themselves environment—architecture, sculpture, and painting unified by a new relation of interdependence.

If this hope-laden possibility for the future ever becomes real, light will be its mainstay. For what other aspect of our visual environment could better serve than light—in detail as connecting joints, within the totality as persisting, unifying, space-animating focus?

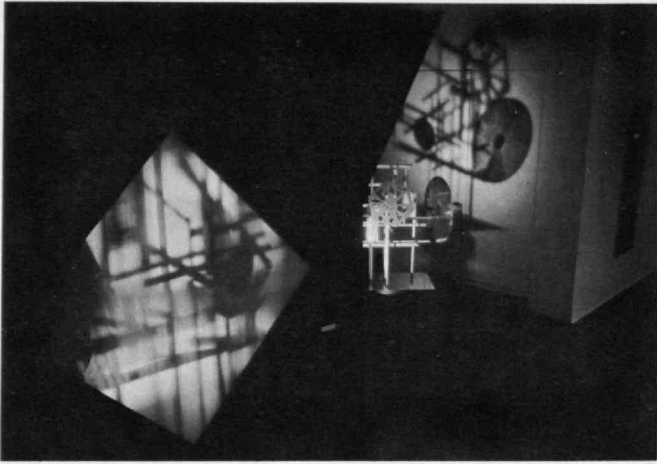
As implied before, these innovations of the past generation were only the first lisplings of an emerging richer language that only now has begun to receive its grammar. Whether we fail or succeed in trying to make valid use of this language and express vital thoughts will depend upon the present generation's ability to discern the creative issues relevant to our own time. To utilize the vision of the last generation, the present generation has to learn to see purposes; the past is over. Its dreams are real only insofar as they are remembered on the awakened immense scale of the present. A thoughtful and sensitive artist, Otto Piene, once wrote me a letter that touched the heart of the matter. "The difference between Moholy's time and our time to me," Piene said, "is the difference between dreaming dreams and undreaming them, i.e., letting them come true. I think the courage to face reality is there—and the awareness of the difficulties as well.

"The springing up of light art all over the place is reassuring, naturally, but also inspires doubt. If the strong spiritual forces don't get to work in a concentrated way now, light art might get into the hands of the art market and, therefore, might not do much more than provide the object-stricken consumer with a new thrill. Expansion does not help if it is boxed in handsome cans. To me light does not travel in suitcases. Articulation of light over long distances is what I consider important. That might free the world of art from the art world."

Yes, we need new tools and new media, for we must ready ourselves for new tasks. Contemporary art at its bravest has outgrown the cage of little shelters. Our new materials, like our new needs, suggest a new scale of action, the exploded scale of our big new environment.

Light as an Expression of Our Wholeness

It is not accident that our flexible, speedy, and impressive tools of artificial light arrived at a time when artistic forms were to express the structural nature of the immensely expanded scale of our contemporary life: *interdependence*.



The physical "law of similarities" tells us that no structure can be extended beyond certain limits without endangering its cohesion and functional unity. Some 300 years ago, Galileo, one of the first observers of quantitative relationships, said in his *Dialogues*: "Clearly, then, if one wishes to maintain in a great giant the same proportion of limb as that found in an ordinary man, he must either find a hardier and stronger material for making the bones, or he must admit a diminution of strength in comparison with man of medium stature; for, if his height be increased inordinately, he will fall and be crushed under his own weight."

We also know from biology, that when an organism grows, its volume increases out of proportion to its surface. As size increases, the absorption of nutriment and the elimination of waste must take place on a much faster time scale than before; otherwise growth is impossible. The intricate physiology of higher animals based upon these relationships must change, too. To achieve an internal order, structural readjustment becomes necessary.

Like biological organisms, cultures must find their unique structural readjustment. Ours is no exception. The immensely expanded and ever more intricate physical and social environment of this century has demanded new notions of structure. Men of the Nineteenth Century could proudly believe that the health of society was based upon the independence and power of the individual; and that is where they put their confidence. But the significant expansion of the world through the accumulation of independent individual efforts seems to have reached its limit. Today we are moving toward an almost diametrically opposite guiding structural principle. *Interdependence* system thinking has become a central notion that seems to offer the best chance for survival and for the optimum satisfaction of individual needs. All society, in fact, is now woven into an immense, three-dimensional fabric that junctions and intercommunicates through the intricately interconnected workings of all its members.

But the *de facto* basic interconnectedness all about us is reflected in our ideas, purposes, and institutions only rarely; and we are plagued by unresolved tensions between personal and social needs and between the individual and the environment. The dynamic interconnectedness of contemporary life has been reflected least of all in art, which, with rare exception, has remained largely private and personal in character even when used for ostensibly civic purposes. Yet as citizens and practicing members of this society, we are committed to the search for public forms that express our collective values and symbolize our shared needs and common aspirations. The search for civic form and widespread public significance goes on, and, lately, has acquired great momentum.

The relevant structural aspects of the contemporary world are signposts that guide us toward the concrete realization of forms that express contemporary values. In the visual arts, those ideas will be the most enduring and powerful which evoke in the individual a sense of interdependence. Artistic images that suggest interdependence—the dependence of every one of us on every other and of all persons in society as a whole—whether through the way in which the images are made or through the symbols of life which they create, will stand above all the acrobatics of the contemporary artistic scene. Such images will be realized at the highest level when the latent poetry of the urban-industrial world is brought into the open and infused into visual structures informed by the idea of dynamic community.

Of all the media presently available to artists, light seems to present the richest concrete and symbolic possibilities for the expression of the interdependence principle of the modern scientific urban-industrial world. It is not a substance; it is energy. Without boundaries, it molds, shapes, clarifies, and joins forms and spaces, connecting perceiver and perceived and bringing them to vital coherence.

To Sense the Wholeness of Our New Experience

On what feelings already within us can we build our new sense of dynamic interconnectedness?

Our individual and our common life both begin with a happy oneness with our surroundings. There are dim, half-buried collective memories of oneness that we yearn to recapture without any expectation of success in doing so. But, in addition to this unattainable and almost forgotten happy land, we have more easily revived individual memories of oneness with our surroundings.

We are all acquainted with rare moments when meaning swells into double meaning or many meanings and the world manifests itself not as sepa-

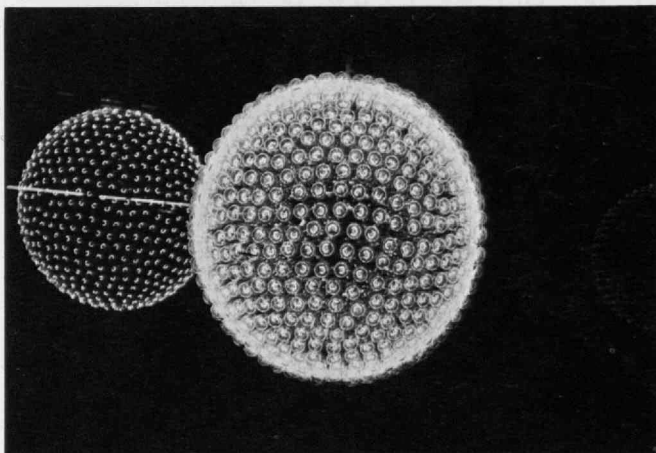
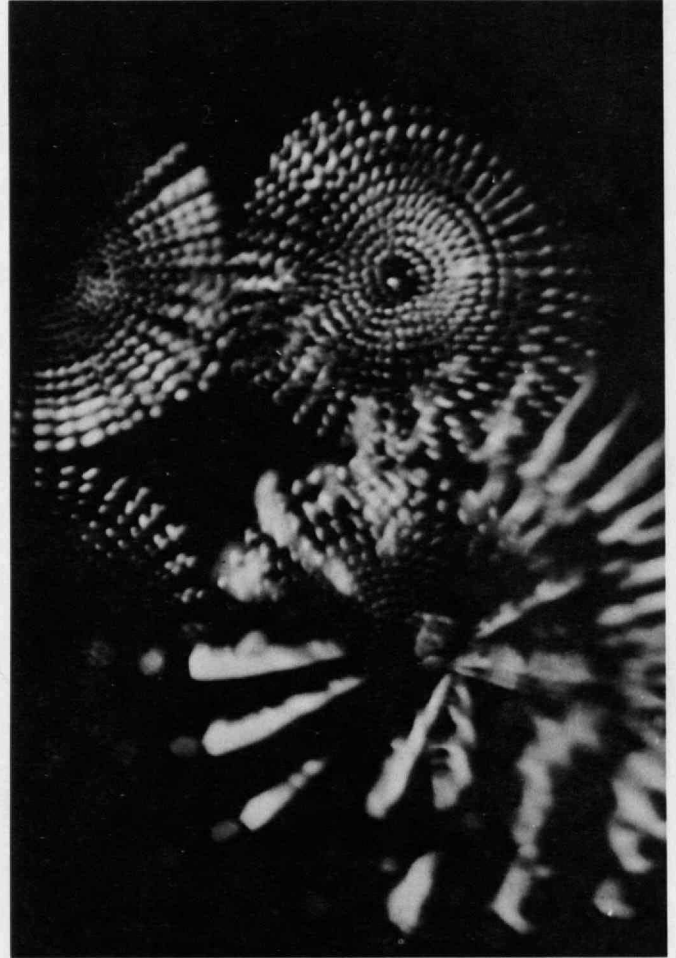
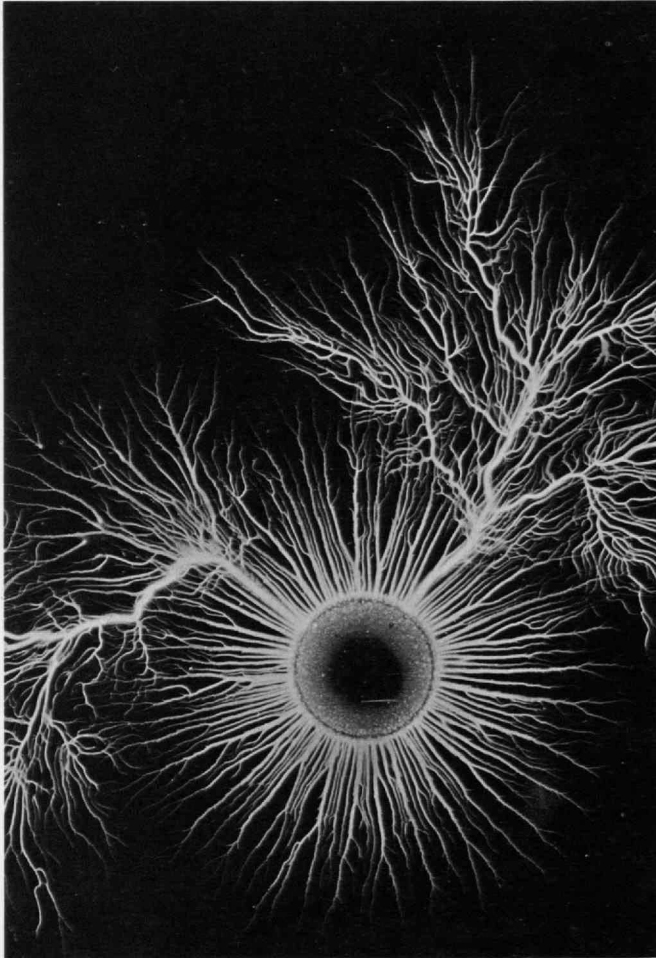
(Opposite) Kinetic light sculpture, Nicholas Schöffer. (Photo: Yves Hervognon).

Electric discharge pattern, Arthur R. von Hippel.

"Planetary light" chandelier for the State Theater, Bonn, Otto Piene.

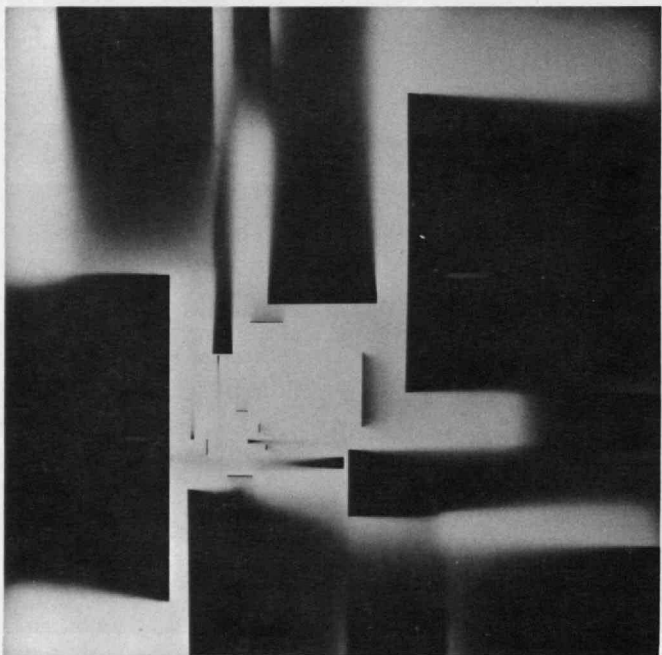
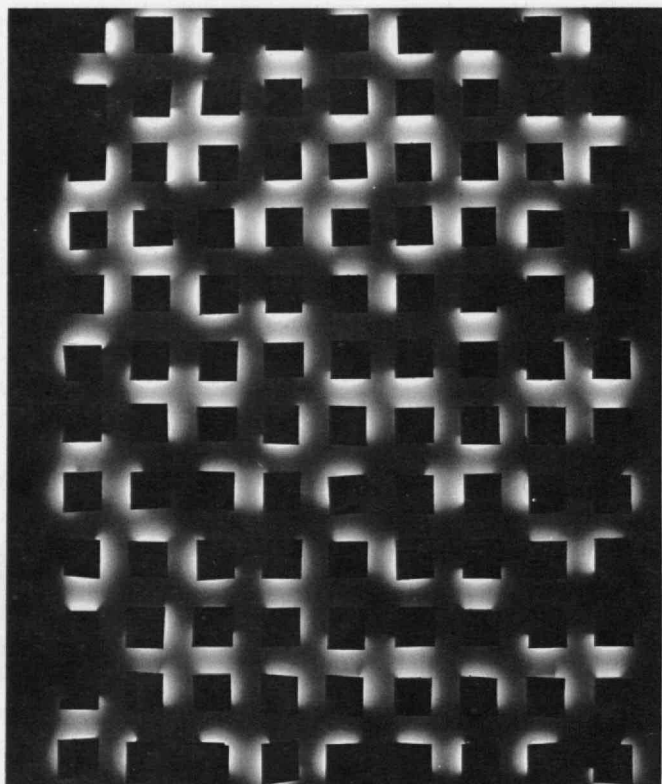
Projected light reflections—ballet scene recorded on photo-sensitive emulsions, Otto Piene (1960).

Computer graphic, John H. Whitney (1964).



Photograph—shields in front of small windows, Samuel L. Russell, '48 (1957).

Light ceiling, Michael F. Southworth, M.C.P.'67 (1965).
(Photo: Nishan Bichajian.)



rated territories but as a living whole. These are moments in which single feeling takes over and we seem to dissolve into the world around us. Children who are allowed to be children sometimes reach such happy complete involvement. One of my cherished memories is watching my pre-school-age daughter each summer for two or three years when she arrived at the beach: the very first day she appeared to be almost literally transformed, running around in wild joy as if she would embrace the open space, opening her arms in caressing expectation of a return embrace from the open space, touching, seeing, and tasting the free new surroundings with her entire responses.

Inevitably, most of us lose the marvelous capacity we had as children to sense life in its fullest whole. Present adult civilized life is systematically cut up, scheduled, and parceled out. We live by timetables and maps. We can recount the year, day, and hour in which something happened, and place it in the right house, street, and country, but we forget its taste and color. The capacity for sensing our belongingness, which gives living its color, richness, and, really, its justification, is drained out of most of us.

What we have lost we sometimes miss, discovering the difference between life as it is and life as it could be. With shock and terror, we see how empty we are. And, unwilling to acknowledge the fact that we have turned into cornered beasts, we seek release by creating new foundation experiences that restore our confidence and enable us to reconstruct unity in the world. Artists, the men among us who retain the capacity to feel intensely, know how to build models of the missing quality of living and create experiences that are analogues of the richness that is missing. Nietzsche, in his *Birth of Tragedy*, has a beautiful image to describe this second inner working. He said of the Apollonian hero image that "we shall suddenly experience a phenomenon which has an inverse relationship to one familiar in optics. When, after trying hard to look straight at the sun, we turn away blinded, we have dark colored spots before our eyes as restoratives, so to speak; while reversing the color, those light picture phenomena of the Sophoclean hero—in short, the Apollonian of the mask—are the inevitable consequences of a glance into the secret and terrible things of nature. They are shining spots intended to heal the eye which dire night has seared." And we all know, artists or not, that we must have new inner models in order to survive. The new difficulties that we experience bring us face to face with even more menacing new terrors. We are engaged, therefore, in a frantic search for "shining spots," those inner models from which we can take guidance in our efforts to overcome our bitter isolation and change our bleak environment. Our new conflicts, then, are greater than ever before;

and, consequently, we must have newer, brighter models in order to rebuild and clarify life.

The value of what is new is not in mere newness. Its newness is relevant to our crucial search only insofar as it is spelled out in contemporary new terms based on the actualities of contemporary life. In this sense, newness in art implies the acceptance of new tasks, tools, and media grown out of Twentieth Century conditions, the welding of a new creative vision through the artist's top-to-bottom grasp of what is genuinely, truly, and deeply relevant. In the final reckoning, the basic issue is not an individual's vanity but the common values yielded by the honest exercise of imaginative vision. All the rich and many faceted aspects of Twentieth Century art can be made to fall into meaningful place when a sweeping human vision is found to elucidate the relevance of our accumulated richness to our deepest contemporary human needs. Then our impressive technical skills and our strengths and nuances of artistic qualities will become the building blocks of a good and common life rather than mere emblems of narcissistic ego.

There are two major directions where relevance can be made manifest. One is in the aesthetic reconstruction of our new urban environment. The other aspect of contemporary art with promise of survival value is the schooling of our sensibilities by artistic images that enable us to respond to the tremendous scale of our new world. To reach these goals, the images and forms that artists create must have vital commitment at their very core; they must speak in terms of essential perceptual needs.

The potency of artificial light as a visual medium that answers our physical and symbolic needs is in its aspect of dynamism, manifest even in the infant art of today—a dream of the recent past, and little more than the germ of the hoped-for art to come.

Kinetic idioms have been in phototropic art from the Nineteenth Century to the Twentieth, incorporated

from the blazing images of Turner and the French Impressionists and the coruscating motion of the Cubists and Futurists, the color animated light-hungry canvases of Delauney down to Gabo's figures of rotation, Calder's mobiles, and the artificial-light structures of Moholy-Nagy, Thomas Wilfred, and others. Inherent in their vision was the idea of random, chance movement as against a rhythm of the mechanical environment. Randomness was the goal of a generation of artists who tried to put into their images of movement the freedom and spontaneity of nature: the paintings of Arp, Miro, and Pollock evoke man and nature's common rhythm. Other pioneers of Twentieth Century art—Malevich, Lissitzky, Tatlin, Kiesler, Brecht, and Artaud—had large-scale visions, visions not of static structures scaled to a room or a building but of an all-involving total environment. Inherently, such designs required more for their realization than a single man, a single vision, or a single craft; they could only be accomplished on their dreamed-of scale by the co-operative interaction of many men of many disciplines; artists on the one hand and scientists and engineers, experts in electronics, optics, illumination and power engineering on the other. If such designs have never become physical reality on the scale required, their motivating ideas—artificial light, kinesis, randomness, environmental scale, and interdependence—are the parameters of the central art of our future. A phototropic generation of artists and designers has emerged, and their numbers and talents seem an omen of great accomplishments to come.

Gyorgy Kepes is at once one of America's distinguished contemporary artists and an articulate spokesman for a "language of space" describing the interrelations between visual experiences, modern technology, and human problems. He is Professor of Visual Design at M.I.T., having come to the Institute in 1946 following work in Berlin with Moholy-Nagy and teaching at the Institute of Design in Chicago. Of the illustrations accompanying this article, those by Messrs. Brown, Flint, Russell, Southworth and Williams represent student projects for M.I.T. visual design courses. Messrs. Garnett, Piene, and Whitney will be fellows of the new M.I.T. Center for Advanced Visual Studies under Professor Kepes' direction during the current year.

New architectural forms are now being pioneered by architects using concrete, the end product of the cement industry. The T.W.A. Terminal at Kennedy International Airport illustrates the scope of this traditional material when incorporated into modern thinking. (T.W.A. photo by Ezra Stoller Assoc's.)



Increasing demand for cement is stimulating new attitudes towards production technology, industrial organization, marketing, and the role of government in the industry

Henry N. McCarl, '62, and George H. K. Schenck

Cement: Foundation for an Expanding Economy

We walk on it everyday. We drive our cars over it. Most of our buildings stand on foundations in which it is an important component. Many of our homes and offices employ it in decorative ways as well as depending on its structural strength. And when we die, we may even be encased in it.

Cement is a commodity so common we rarely think of it, but it is nevertheless basic to our way of life and the nation's economy.

To the chemist, cement is a complex of calcium and aluminum oxides and silicates; to the structural engineer it is the adhesive which creates concrete from loose stone or sand and gravel; and to the contractor, it is a basic commodity used in almost every type of construction. By itself cement has no utility, but combined with mineral aggregates (such as sand, crushed stone, gravel, or slag) and water, it can be cast as concrete into many useful forms.

In 1966, consumption of cement in the United States amounted to about \$1.2 billion representing about 390 million 376-pound barrels—the standard measure of this commodity—with a value of about \$3.18 per barrel. Production of cement has grown faster than that of nearly all other major construction materials since World War II. By 1975, the annual use of cement should reach 450 million barrels with an estimated value of about \$1.6 billion.

About 75 per cent of all construction activity is new construction. The largest single component of this, residential construction, does not have a proportional impact on cement use: 43 per cent of the dollar value of new construction versus 25 per cent of cement use. Direct government programs, on the other hand, tend to have much greater impact on cement use than their proportion of new construction would indicate. For example, each dollar spent on highways means almost four times as much production to the cement industry as does another dollar which would be spent on residential housing.

To keep pace with our changing times, the cement industry has experienced significant changes in almost every aspect of its operation. Today, the major areas of change include production technology, industrial organization, marketing, and government attitudes toward cement producers.

Advances in Production Technology

To appreciate the various advances in the manufacture of cement, we must first look at the basic steps in cement production from the mining of raw materials to the resulting marketable product.

The basic raw materials include limestone (or cement rock, and impure limestone), shale, clay, slag, sand or sandstone, and small quantities of iron ore. The raw materials are reduced in size by crushing and grinding to obtain fine particles with large surface area which will accelerate the appropriate chemical reactions between components during pyro-processing. The crushed and ground materials are blended and homogenized to obtain the exact composition and uniformity desired. The blend is then heated, usually in a large rotary kiln, producing new compounds (which later will react with water and mineral aggregates to form concrete through recrystallization). The burned product is pulverized to a fine size in finishing mills to increase its reactivity, and gypsum added to regulate the reaction time. Finally the resulting product—finished cement—is shipped to customers in the market area served by the production plant.

Prior to 1960, most cement plants had production capacities of less than four million barrels of cement per year. Since then, larger plants have emerged with capacities of six to 10 million barrels per year. These new plants are often built around super-sized cement kilns of two to seven million barrels per year capacity. The capital costs of the new plants, which range from \$5 to \$8 per barrel of annual capacity, compare very favorably with the \$10 per barrel cost considered as the industry's average a decade ago.

Recent engineering advances have made possible significant reductions in cost through savings in labor and fuel requirements, better quality control, lower overhead costs, more efficient materials handling systems, and volume purchasing of supplies. Control of the production process from central control rooms incorporating computer systems which command feed rates, process temperature, finish grinding and stockpiling, has led to considerably higher efficiencies than those realized in older systems. Such modern production lines incorporate x-ray analyzers to control raw material blending, nuclear sensors and sophisticated thermal mechanisms for kiln control, and the most advanced temperature and pressure gauges.

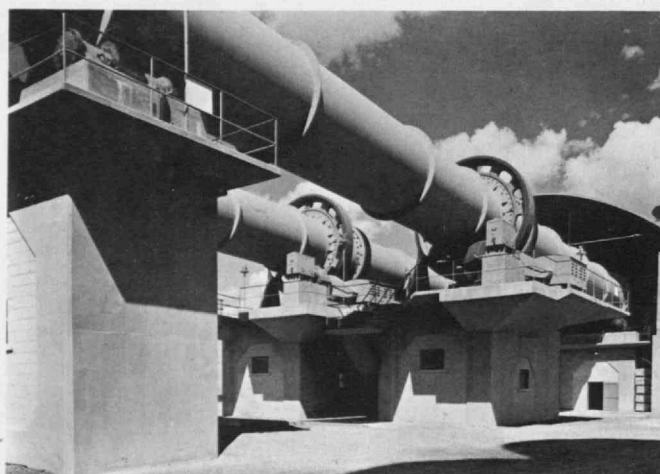
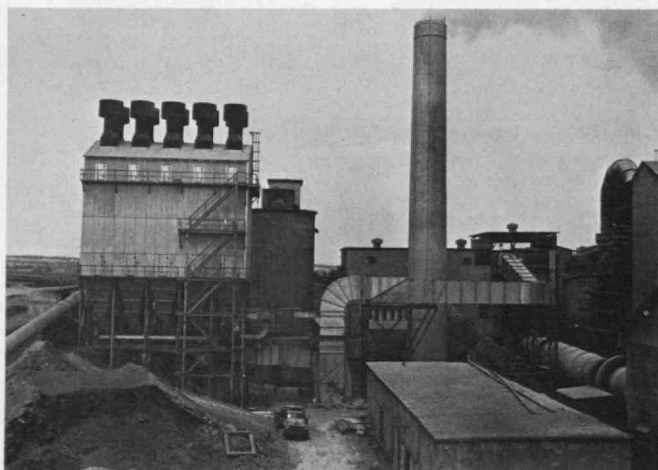
The use of computers has led to considerable savings in repairs to and replacement of refractory kiln lining, as well as reducing over-all plant maintenance costs. The benefits of computer control include optimization of kiln feed rate, close regulation of fuel consumption, maintenance of steady production flow, and reduction in the time equipment lies unused.

At several of the most modern cement plants, high-speed digital computers monitor all phases of production from raw milling to finish grinding and storage. Records of feed rate, fuel consumption, and crucial data are kept automatically by computer print-out, and closed-circuit television systems give operators a view of grinding, burning, and cooling processes.

The central attention of the cement plant generally focuses on the cement kiln, the reactor in which raw material is burned. Most plants use the traditional rotary kiln, a long tubular vessel lined with refractory material, which rotates slowly to allow material free movement through the burning process. Considerable effort has been spent in the design of kilns to reduce fuel consumption by improving the efficiency of the burning process. Increased kiln size, redesign of feeders and heat retention devices, and new shapes of the kiln structure and refractories have reportedly produced major savings in manufacturing costs.

The development of a compact, highly efficient, low-capacity vertical kiln could change some of the economies of cement production. Whereas the new rotary kilns have annual capacities of between two and seven million barrels, the vertical kiln is said to be economical at annual capacities of less than 750,000 barrels. A smaller kiln of this type could provide a competitive advantage to smaller plants located closer to markets than is currently the case.

The specter of air pollution inevitably arouses the



Dust control presents cement manufacturers with yet another problem. In this photograph, a fiber glass baghouse on the left cleans gases from a new long kiln while the stack at the right center discharges partially cleaned gases from two old short kilns equipped with multiple cyclone dust collectors. (Photo: Lehigh Valley Air Pollution Authority)

Raw materials are converted into cement in large rotary kilns at temperatures of about 2700°F. The kilns are often more than 12 feet in diameter and longer than a football field; they rotate at a rate of about one turn per minute. The newest rotary kilns have capacities between two and seven million barrels of cement per year. (Photo: Portland Cement Association)

public today, and because cement manufacture produces large amounts of dust in all its phases, from quarry drilling to loading of the finished product, the industry has long been a target of local criticism. To control dust emissions fully, it appears necessary to install from 20 to 60 high-efficiency collectors throughout a cement operation. Recently, after years of negligence, a number of companies, particularly in the crowded Northeast, have come under increasing public pressure to do this.

Continued modernization will place increasing emphasis on the use of computers and electronic controls, and growing public concern over air pollution will necessitate continued heavy outlays for dust collection devices.

An Integrating Industry

For many years, small firms serving local and regional markets with the single product characterized the cement industry. However, as a result of declining profit margins during the last decade, larger firms have sprung up through both mergers within the industry and the entrance of firms from outside. Small companies, which could not compete with the economies enjoyed by the larger concerns either sold out to them or combined with each other.

As a result of mergers among the top 20 producers in the U.S. cement industry, the number of companies producing cement decreased from 72 in 1946 to 48 in 1966. Consequently, the market share of the 20 largest firms increased from 73 per cent to 83 per cent in the period 1950 to 1964.

In broader terms, there is an increasing tendency for cement producers to enter the field of their principal consumers (concrete or concrete products) and for concrete producers to return the compliment by moving into cement production. The Federal Trade Commission has challenged a number of these intended expansions of interest, and in January, 1967, issued a broad prohibition against any future acquisition by a cement producer of any substantial ready-mixed concrete supplier.

Some cement producers are also moving further afield in their efforts at expansion, into such enterprises as petroleum refining and real estate. And producers of other construction materials are themselves eyeing the cement industry keenly, and in a few instances moving into it. Such is the current organizational picture of the cement industry: increasingly, larger firms are integrating more fully within the cement-concrete industries and they are acquiring diverse interests in other areas.

Selling Cement Isn't Simple

Most cement is sold for use in producing concrete which has numerous outlets from the concrete roads on which we drive to the poured concrete or concrete block basement in our house. The diversity of uses, and the fact that substitutes such as structural steel, glass, and asphalt paving material can take over most needs concrete products fill, provide some concept of the problems faced by the marketing group at a cement company. Also, cement varies little from one producer to another, and the product of one manufacturer may be easily substituted for the product of another.

Since demand for cement is derived from the demand for construction, there is no direct link between cement firms' sales forces and the ultimate buyers of the final construction. Before any cement is sold, a construction contract for a portion of highway, a school, or a house must be signed—a much bigger decision than a choice between brands of cement. Thus, the most important marketing activity for cement occurs in the office of the highway engineer, school architect, or home builder. It is because of this that cement sales efforts seem to group themselves into three general areas: promotion of concrete, providing various services for concrete producers, and social or good-will selling to concrete firms.

Because of the undifferentiated nature of cement and the sophistication of buyers, few sales are made on the basis that a unit of brand A cement provides more per dollar than does a unit of brand B, except when prices are cut. Though cement firms appear to avoid price competition, it has occurred often enough in the last several years for executives to decry it in the trade press. The industry's preference for non-price competition is reasonable in the short-run, for even large changes in the price of cement in the normal range between \$3 and \$4 per barrel have little effect on its choice in constructing a building: the cost of cement accounts for only a small proportion of the final cost of most of the construction in which it is used.

Service provided by cement companies to concrete firms entails numerous sales engineering activities such as design of concrete mixes for specific applications, and trouble-shooting when concrete performs inadequately. Financing of concrete firms by allowing accounts receivable to climb to relatively high figures is also an important competitive tool. Shifting of inventory from the customer's receiving bins to the cement company probably has been the major competitive method to increase sales. This is done by building a terminal facility close to a group of customers and

shipping truckloads (100 barrels) at intervals of an hour or less to the buyer if he wishes.

Transportation charges represent an important factor in the delivered cost to the consumer because of the low unit value and large number of units used. Because of the expense of transporting a bulk product such as cement, the relative availability of the major raw materials, a weight loss of 40 per cent during the burning of the raw materials, and uniform product characteristics, markets tend to be limited to a radius of between 100 and 200 miles from a distribution point. As a result, each market usually contains a small number of producers and a large number of consumers.

Much of the pressure to find new outlets for the increased capacity of cement mills across the nation has expressed itself in rapidly changing distribution patterns and techniques, as producers try to enlarge market territories by invading new areas. It was this type of activity that prompted Robles B. Martin, President of Dundee Cement Company, to state recently: "It is my prediction that the traditional small plant with its usual small marketing areas will be so hard pressed to compete that it will ultimately disappear."

A large plant serving a number of regional markets has the advantage of requiring only a small sales penetration into any one area to reach a satisfactory level of operations. As an additional benefit, this type of arrangement is not overly sensitive to regional fluctuations in construction or entry by additional firms. In contrast, smaller, locally oriented plants have had to contest with new mills for their traditional customers.

As an example, Dundee Cement is investing heavily in its theory of plant location with the newly opened 7,000,000-barrel/year plant at Clarksville, Mo. This plant will serve a network of widely distributed terminals along the Mississippi River. In the northeastern states, small Lehigh Valley producers have a serious disadvantage when competing with Hudson River producers, who have water access to Atlantic Coast markets. To regain competitiveness in marginal markets, many of the inland plants have built strategically located distribution terminals (about 250). This has provided customers with faster service but has cost cement firms dearly. Large inventories, transportation, and additional labor and management have added expenses that cannot be passed on easily to customers.

Better use of recent developments in transportation promises to help many companies cut costs in distribution, and broaden their effective market areas. Many railroads are providing new or im-

proved services to cement companies. One example is yard transshipment, trade named Flexi-Flo by the New York Central Railroad. This technique permits delivery of cement in special railroad cars at a distance by eliminating expensive terminal installations and associated labor costs. This method apparently yields substantial savings and provides greater flexibility of movement in meeting the shifting location of demand.

There are indications that 1966 saw a new high reached in the amount of cement traded between producers. Unfortunately, data are unavailable on the use of product exchange agreements but this idea appears to be developing in California where there are many producers and long distances between their plants. The advantage of product exchange is that it reduces transportation charges.

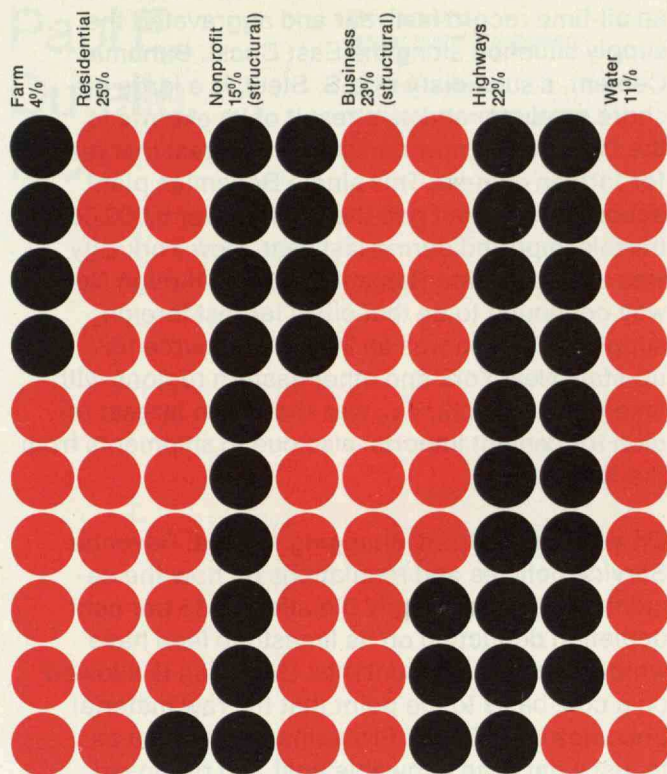
Two Faces of Competition

There are many alternatives to the use of concrete for construction, and it is not surprising that competition for the construction markets served by cement increased during 1966. Esso Research licensed several firms to produce structural units from BMX—an asphaltic binder for common soil. It is reported that units such as blocks are produced at costs substantially below comparable concrete products.

Use of fly ash, which reduces the amount of cement required in concrete mix, was increasingly advocated by coal and utility groups, who hope to gain a market for this waste product of steam generation. Use of special steels in commercial structures and earth in filled dams displaced concrete in several major projects during the year.

The greatest opportunity for cement producers lies in increasing the demand for concrete. An industry goal is to broaden the use of concrete in construction and to find new applications by making concrete products more competitive with alternative building materials such as steel, wood, asphalt, and plastic. Refinements of prestressing and precasting techniques and use of lightweight aggregates are already permitting concrete to make inroads on the use of such traditional structural materials.

Precast-prestressed concrete facings and tilt-up elements are being used more extensively in the floors and roofs, exterior walls, and structure of buildings, and concrete is finding greater acceptance in architectural design for schools, churches, and office buildings. Use of lightweight aggregate, such as expanded shale, in a concrete mix can decrease the weight and permit unique structural designs using umbrella roofs,



Cement use: total nonprofit 48%

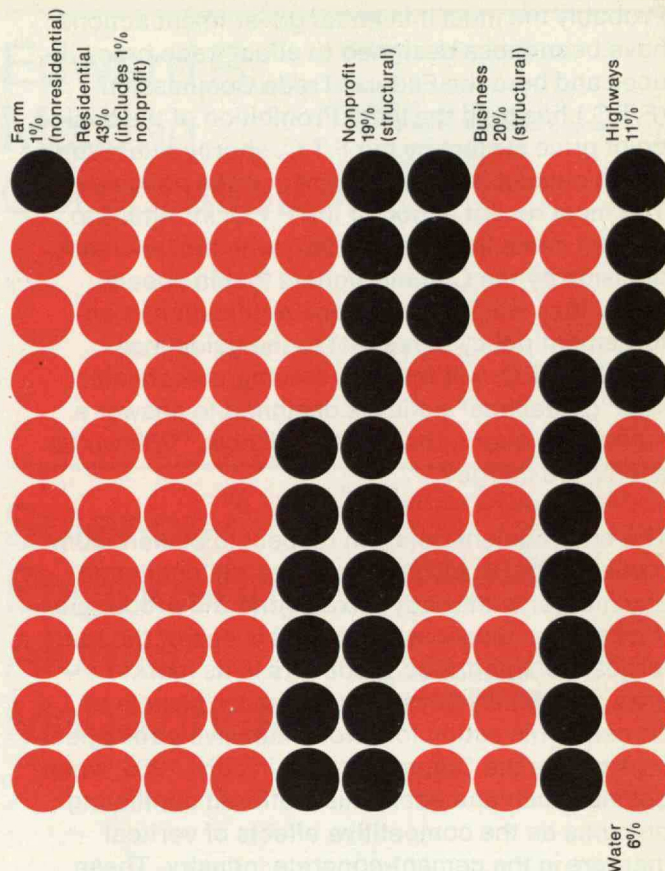
Cement is used by all kinds of activities (left) and in all forms of new construction (right). Nonprofit users represent primarily public bodies but also include private, nonprofit activities. The right hand diagram, based on dollar value of concrete construction, does not give an exact picture of the relative impact of different uses on cement production. For example, each dollar spent on highways gives the cement industry almost four times as much production as a dollar spent on residential housing. (Data: *Rock Products Magazine*)

thin shell canopies, and domes. Exposed aggregates recently have become popular for producing textured-surface effects in commercial buildings. In addition, development of white cement has added to the product's aesthetic appeal to architects.

Government Attitudes

As a group, various government bodies are the largest buyers of concrete although they purchase little cement directly. Government buying of construction profoundly affects the cement industry. For example, the Inter-state Highway Program spawned major programs in the late '50's for new cement mills across the country and the entry of a number of firms into the industry.

Because they are major buyers of construction, highway departments and other agencies, by adopting new technology, have had an important effect on the industry. It was their use of pre- and post-stressed concrete shapes for bridges that



New construction: total nonprofit 36%

first gave impetus to this market for cement. In a reverse situation, the writing of specifications by the Alabama Highway Department calling for use of fly ash has increased the use of this material as a substitute for some cement in standard concrete mixes.

During the past 18 months, Federal Reserve Board action helped drive the interest rate up and had the desired effect of reducing private outlays for new construction. Direct reductions in federal spending for construction and urging that local governments do likewise slowed the government sector at the same time. Thus, cement company managers again witnessed the vital impact that fiscal and monetary policies can have on the fortunes of their companies. In a different economic climate, the federal government presumably could use its "model cities" program and urban renewal as a buffer for the economy. Such actions would provide a major stimulus to the use of concrete and cement.

Probably the most influential government actions have been those designed to affect trade practices and here the Federal Trade Commission (F.T.C.) has held the lead. Prohibition of the basing point price system by the F.T.C. shortly after World War II caused a major change in price policies. The most recent action of the F.T.C. in regard to cement came in January, 1967, with the landmark decision by the Commissioners that in special cases they will issue advance notification of enforcement policy in respect to the guidelines that the F.T.C. will follow in issuing complaints. The "guidelines" policy is designed to answer a manager's query, rhetorical until now, "Will we be sued if we merge?"

The enforcement policy in respect to cement companies is that the Commissioners will challenge any merger with ready-mixed concrete producers if it involves a concrete firm that is one of the four largest nonintegrated producers in its market area or annually buys 50,000 or more barrels of cement. This action followed extensive public hearings before the Commissioners in July, 1966, when businessmen and economists offered conflicting opinions on the competitive effects of vertical mergers in the cement-concrete industry. These hearings followed release of a lengthy economic report by the Bureau of Economics of the F.T.C. titled "Mergers and Vertical Integration in the Cement Industry."

The Commissioners wrote in their policy statement: "Vertical mergers and acquisitions are today the most significant, critical and important, problem faced by the cement and ready-mixed concrete industries . . . The Federal Trade Commission has concluded that (these) can have substantial adverse effects on competition in the particular market areas where they occur."

Several cement firms have in the past aggressively sought to integrate forward into production of ready-mixed concrete. This results from a concept expressed by the president of one of the three largest firms, "To view ready-mixed methods of processing cement into concrete as a separate industry is to distort its role as part of the cement-concrete industry." However, an equally important firm published a statement: "It is our belief that the functions of the ready-mix concrete producer are quite different from the manufacture of cement. We do not wish to become a competitor of our customers in ready-mix. . ."

The executive branch of the federal government influences the industry in a number of other ways. For example, while there is a tariff on imported cement, it is not substantial—2.25¢ per 100 pounds—for G.A.T.T. countries. Imports, although

small in relation to total domestic volume, reached an all-time record last year and aggravated the supply situation along the East Coast. Bahama Cement, a subsidiary of U.S. Steel, is a large off-shore producer and as a result of its exports to the U.S. Florida now ranks as the largest market for foreign cement. This single Bahamian plant accounts for about half the total of over 6,000,000 barrels imported during last year. New York City was another prime Bahamian market though Norway continued to be that city's largest foreign supplier. Canada was an important source for up-state New York and other eastern regions with lake ports. Norfolk, Va., was the fourth largest region for cement imports, also due to shipments from the Bahamas.

On yet another front, changing Internal Revenue Service policies and regulations on how the cement industry may apply the allowed 15 per cent depletion deduction on its limestone feed have whip-sawed tax accountants. Depletion is allowed on a cost basis to the point that the raw material becomes "kiln feed." Problems have arisen as to just what is an allowable cost and proposed changes by the I.R.S. in this regard have the industry concerned.

The cement industry thus faces changes on many fronts. Advances in production technology are adding to the industry's efficiency and lowering costs; mergers between firms both inside and outside the industry are rationalizing its organization; and marketing is becoming increasingly tailored to the needs of cement consumers. In addition, the effective control of government over the industry's policies faces re-examination.

Direct intervention by the Federal Trade Commission and the Justice Department is likely to continue whenever Washington senses mergers or acquisitions which it feels tend to have anti-competitive possibilities. Such challenges appear to be in prospect for most vertical mergers or acquisitions by firms engaged in the production of cement and concrete. Only the future will determine if such government action is truly in the best interests of the industry and the economy as a whole.

Mr. McCarl is a Market Research Analyst with Vulcan Materials Company, Birmingham, Ala. After receiving his S.B. degree in earth sciences at M.I.T. in 1962, he went on to The Pennsylvania State University where he received an M.S. in geology and additional graduate training in mineral economics. George H. K. Schenck is Assistant Professor in the Department of Mineral Economics at The Pennsylvania State University where he received a Ph.D. in mineral economics.

Paul E. Dutelle, Inc.

Roofers and
Sheet Metal Craftsmen

153 Pearl Street
Newton, Massachusetts
02158

Edward R. Marden Corporation

Builders and Engineers

Edward R. Marden '41
President
Registered Professional Engineer

280 Lincoln Street
Allston, Massachusetts
782-3743

Science/ Engineering Alumni Magazines

Advertisers can reach
the alumni of 32 major
universities with a high
percentage of science and
engineering graduates
at discounted rates

For details write:
American Alumni Magazines
50 East 42nd Street
New York, New York
10017

Alexander Kusko, Inc.

Consulting Engineers

Research and Development in
Magnetics, Electric Machinery,
Instrumentation, Semiconductor
Circuits, Control Systems, Power
Supplies

A. Kusko '44, E.A. Parker, Jr. '42,
C.A. Rambottom '55

141 Main Street
Cambridge, Massachusetts
02142

EL 4-4015

Swindell- Dressler Company

Founded 1850

Engineers

A Division of Pullman Incorporated

Industrial Facilities-Public Works

441 Smithfield Street
Pittsburgh, Pennsylvania
15222

Chicago-Harrisburg-Washington

Lockwood Greene Engineers, Inc.

Complete range of professional
engineering services for the
planning and design of modern
plants for industry

Pan Am Building
200 Park Avenue
New York, New York
10017

Boston-Spartanburg-Atlanta

Syska & Hennessy, Inc.

Engineers

Design-Consultation-Reports
Mechanical-Electrical-Sanitary
Elevator and Materials Handling

John F. Hennessy '24,
John F. Hennessy, Jr. '51

144 East 39 Street
New York, New York
10016

1155 15 Street, N.W.
Washington, D.C.
20005

Brewer Engineering Laboratories Inc.

Consulting Engineers
Experimental Stress Analysis, Theoretical Stress Analysis, Vibration Testing and Analysis, Specialized Electro-Mechanical Load Cells and Systems, Structural Model Testing and Fabrication, Strain Gage Conditioning and Monitoring Equipment.
G.A. Brewer '38,
Marion, Massachusetts 02738
(617) 748-0103

Capitol Engineering Corporation

Consulting Civil Engineers
Robert E. Smith '41, President
Dillsburg, Pennsylvania, USA

Cleverdon, Varney and Pike

Consulting Engineers
Structural, Electrical, Civil, Heating and Ventilating, Air Conditioning, Plumbing
120 Tremont Street
Boston, Massachusetts 02108

Charles Nelson Debes Associates, Inc.

Engineers and Consultants
Structural, Electrical, Mechanical, Acoustical, Industrial, Commercial and Municipal Projects
C.N. Debes '35
915 East State Street
Rockford, Illinois

Eadie, Freund & Campbell

Consulting Engineers
Mechanical, Electrical, Sanitary, Air Conditioning, Power, Process Layouts
James K. Campbell '11
257 Park Avenue South
New York, New York 10010

Fabric Research Laboratories Inc.

Research, Development, and Consultation in the Fields of Fibrous, Organic, and Related Materials
W.J. Hamburger '21,
E.R. Kaswell '39, K.R. Fox '40,
M.M. Platt '42
1000 Providence Highway
(At Route 128 and US 1 Interchange)
Dedham, Massachusetts

Fay, Spofford & Thorndike, Inc.

Engineers
Boston, Massachusetts

Jackson & Moreland

Engineers and Consultants
Division of United Engineers & Constructors, Inc.
Boston, Massachusetts

The Kuljian Corporation

Engineers-Consultants
Utility-Industrial-Chemical
Power Plants (Steam, Hydro, Nuclear), Public Works, Processing Plants, Oil Refineries, Textile Plants, Institutions, Highways, Expressways, Airports & Facilities, Military Installations
H.A. Kuljian '19, E.J. Healy '24
A.H. Kuljian '48
1200 North Broad Street
Philadelphia, Pennsylvania 19121

Loomis and Loomis

Consulting Professional Engineers
Structures, Foundations
Windsor, Connecticut

Metcalf & Eddy Engineers

Boston-New York-San Francisco-Palo Alto

Mueser, Rutledge, Wentworth & Johnston

Consulting Engineers
Foundations for Buildings, Bridges and Dams-Tunnels-Bulkheads-Marine Structures-Soil Studies and Tests-Reports, Design and Supervision
William H. Mueser '22,
Philip C. Rutledge '33
415 Madison Avenue
New York, New York 10017

Maurice A. Reidy Engineers

Foundations and Soil Mechanics
Structural Designs, Buildings, Bridges
101 Tremont Street
Boston, Massachusetts 02108

Soil Testing Services, Inc.

Consulting Soil and Foundation Engineers
Site Investigations, Foundation Recommendations and Design, Laboratory Testing, Field Inspection and Control
Clyde N. Baker, Jr. '52,
Sylvio J. Pollici '56
111 Pfingsten Road
Northbrook, Illinois

Your profits can attract something you could live without!

An innocent piece of metal can help to blow a vigorous plant almost out of existence. Production can stop and millions of dollars can be lost. Human negligence also can contribute a great deal to a disaster of this type. ☐ If such an accident were to happen to you, could you afford it? ☐ To insure that your progress and profits continue without industrial loss is our job. To protect your business with the finest complete coverage is our business. ☐ Isn't it about time we got together? Contact us now.

Boston Manufacturers Mutual Insurance Company / Mutual Boiler and Machinery Insurance Company

FACTORY MUTUAL INSURANCE

EXECUTIVE OFFICES: 225 WYMAN STREET, WALTHAM, MASSACHUSETTS 02154

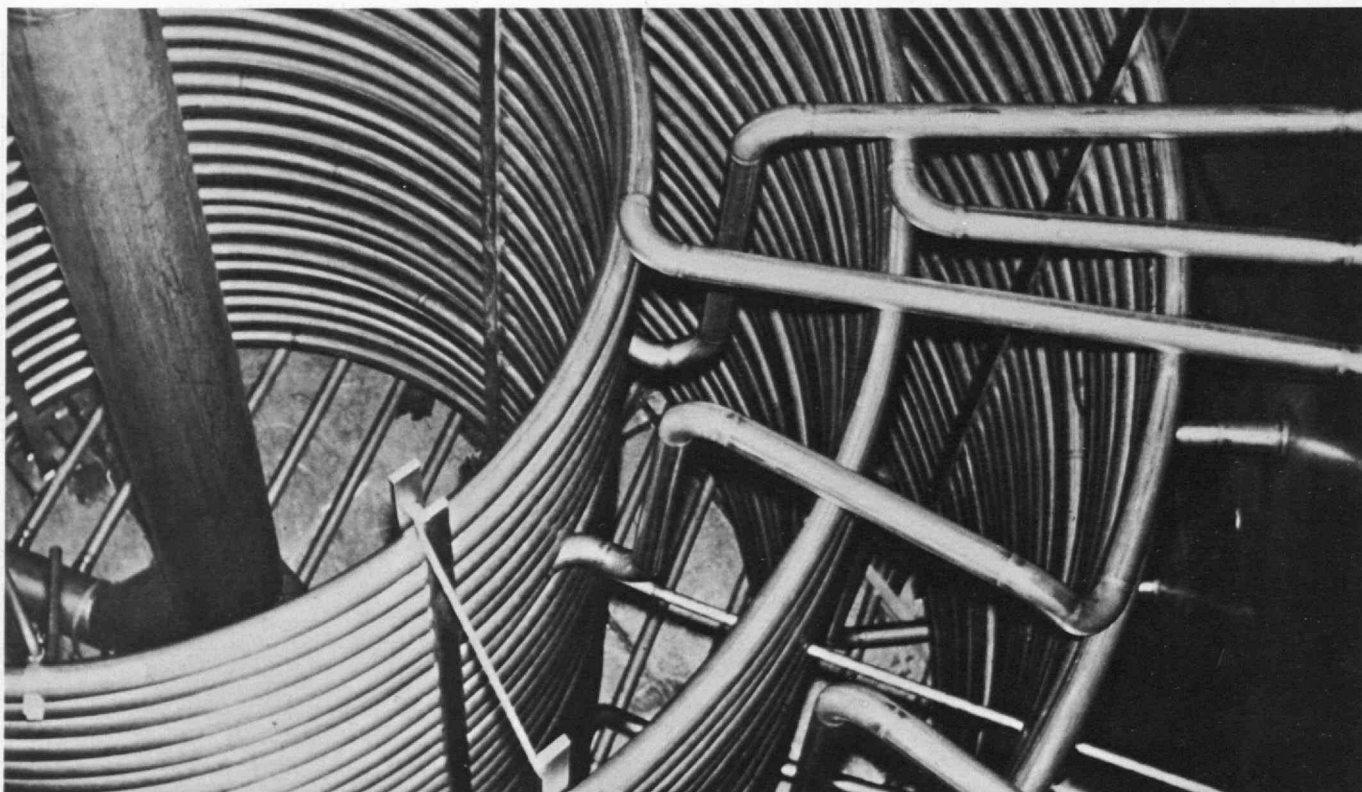
CONTACT US TODAY FOR FULL INFORMATION ABOUT OUR SPECIALLY DESIGNED PROGRAMS FOR INDUSTRIAL PROTECTION AND LOSS PREVENTION OF YOUR PROPERTY.



A defective heat exchanger can eat away your profits the same as a rat nibbles cheese. The piece shown played a major role in a company's two million dollar loss.

Trend of Affairs

Microbial Food



If all the food available in the world were divided equally among its inhabitants, every single person would suffer from protein deficiency.

In fact, over two-thirds of the world's population now receives inadequate protein. In this desperate situation, no single new source of protein can fulfill all the demands of the hungry; every possible means of producing new foods must be actively pursued by food scientists.

But putting new foods into the mouths of the hungry is more than a problem of basic food technology. Social scientists and marketing experts have their part to play in understanding traditions and taboos associated with food in different cultures, and hitting the right note on which to introduce exotic new foods into such cultures.

The favorite food of science fiction writers has long been the combination vitamin-protein pill which fills all the body's needs in an instant. Unfortunately, what this

idea gains in simplicity it lacks in reality: people need bulky foods to supply their need for calories. However, the concept of nonagricultural foods is now becoming perfectly respectable in laboratories of food science and the conference rooms of famine relief agencies.

Prominent among such foods is single-cell protein, the concentrated form of protein derived from such organisms as bacteria, yeasts, algae and fungi. In October, M.I.T. convened an international conference on this topic, to examine the progress in technology and social science towards introducing unconventional sources of protein in general, and single-cell protein in particular, into the hungry, underdeveloped societies which most need such new foods.

The most popular organisms for producing single-cell protein are yeasts. The action of certain yeasts, and also of some bacteria, on sulfite waste liquors from paper mills was found to produce palatable forms of concentrated protein some dozen years ago. More recently, by-products of petroleum and natural gas have

provided the energy sources for the conversion of micro-organisms into protein.

The great advantage of microbial cells as food sources compared with agricultural foods comes from the speed and efficiency with which they produce protein. H. J. Bunker, President of the Institute of Biology in Britain, quoted a notable comparison: a bullock weighing 10 hundredweight can synthesize less than one pound of protein per day; in the same time, the same weight of yeast produces over 50 tons of protein.

Pilot plants to produce single-cell protein from crude oil are now springing up all over the world. Arthur E. Humphrey, S.M.'60, of the University of Pennsylvania cited plans for pilot plants in Czechoslovakia, Taiwan, Communist China, India and the Soviet Union. And the British Petroleum Company, Ltd., one of the first companies to move into the single-cell protein field, has pilot plants in Scotland and France, and designs on the drawing board for full-scale plants.

Gordon H. Evans of British Petroleum told the conference that B.P.'s primary aim at the moment is to produce a component for animal food, although obviously any program of this nature will take food technologists a long way along the path to nonagricultural food fit for human consumption. A. A. Pokrovsky, Director of the U.S.S.R. Academy of Medical Science's Institute of Nutrition, announced that Russian work in the field also has the main purpose of producing animal feed. The theory behind this is that single-cell protein will release from animal feed more conventional types of protein, which will then become available for human consumption. And obviously animals have no food taboos; problems of acceptance are minimal.

During its brief career, single-cell protein has lived under the suspicion of being toxic and even carcinogenic. However, feeding trials by both B.P. and Soviet groups have so far failed to produce any evidence of this. Studies over a number of generations of farm animals (and monkeys in the case of the Russian work) suggest so far that single-cell protein is a safe and nutritious additive for animal feed.

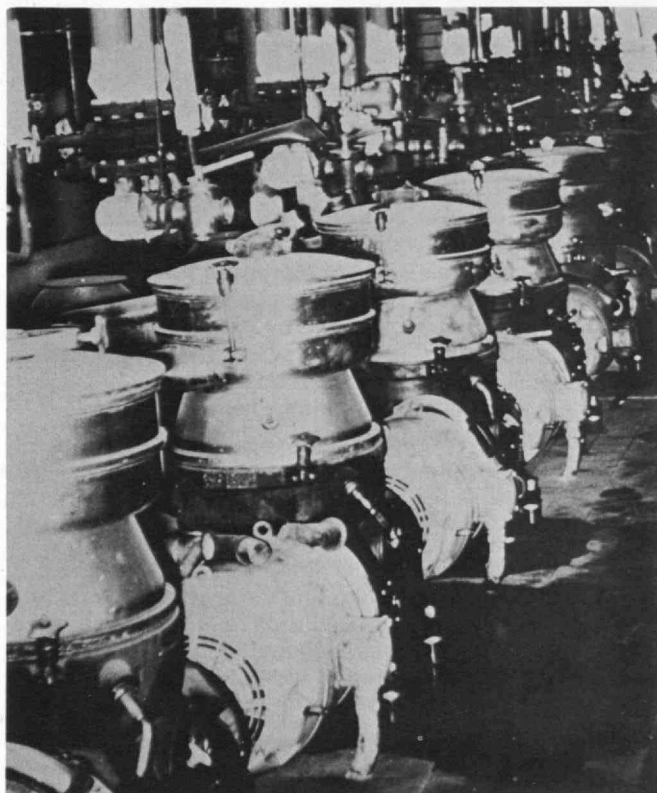
But suspicion remains on the method used to test the fortified animal feeds. Sanford A. Miller, Associate Professor of Nutritional Biochemistry at M.I.T., commented that the majority of toxicity studies used fit and healthy animals, neglecting entirely the fact that the people who most need concentrated protein in their diets are undernourished and far from healthy.

Making the hopeful assumption, however, that single-cell protein will prove palatable, nutritious and nontoxic for humans, how can it best be introduced to the needy?

Contrary to Western expectations, selling new foods to hungry people will not prove a simple task. A new food will not gain immediate acceptance just because local health authorities recommend it. John C. McKenzie, Deputy Director of the Office of Health Economics in London, stated that underdeveloped societies present businessmen with markets just as complex as those in the Western world. Unfortunately, many marketing men appear to forget their textbooks when they venture into underdeveloped markets.

Food fulfills profound psychological needs in all people, as well as forming the background for many social

Artificial foods containing high proportions of protein promise one route to alleviating the world's chronic shortage of protein foods. These foods derive from the action of yeasts, bacteria or fungi on such energy sources as sulfite waste liquors and by-products of petroleum. Photos show two states in the production of microbial food, known as single-cell protein. The fermenter (left), and the line-up of centrifuges used to recover and wash cells (right). The technology of producing palatable single-cell protein is now largely understood, but scientists have yet to overcome the sociological factors involved in introducing new foods to hungry populations. (Photos: Universal Foods Corporation)



events. In addition, different foods are related to each other in a complex interplay. Changing just one major item of the diet, continued Mr. McKenzie, may change the whole pattern of eating. For this reason, new high-protein foods will probably find their best roles as supplements to popular foods.

The problems of food taboos were also highlighted by T. V. Blair of the Polytechnic, London, who called for more basic research by social scientists into traditional food habits, as well as scientific information on the chemistry of traditional foods and the role of diet in preventing disease.

At the present time, then, single-cell protein can play its role as a component of animal foodstuff. Eventually it will become part of human diets, but introducing it to the hungry will be no easy problem. It is very likely that acceptance of new foods will gradually filter down from the well to do, for whom it will fulfill the need of status, to the hungry who need it for their very survival.

Government support of universities and colleges in the years 1963 to 1966 highlighted in a recent N.S.F. survey. During this period, the amount of Federal support almost doubled. A notable contributor to this increase in funds is nonscience spending used largely to construct new facilities in colleges and universities.

M.I.T. Falls to No. 1½

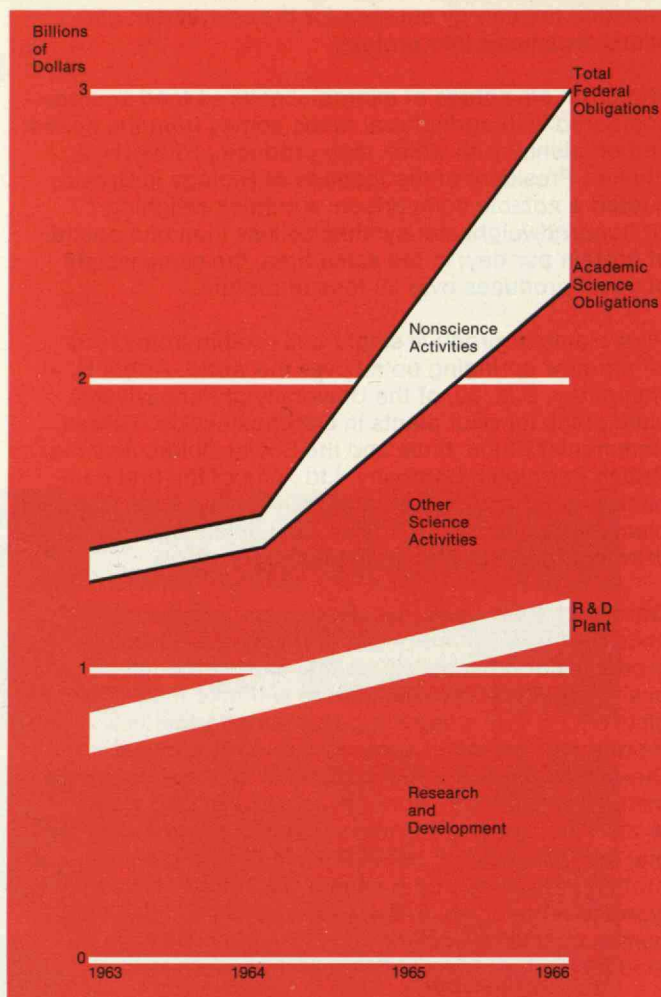
The amount of U.S. government money poured into universities and colleges more than doubled from 1963 to 1966, from \$1.4 to \$3.0 billion. Eight government agencies were responsible for more than 95 per cent of this handout, which reached about 2,050 institutions in 1966, compared with only 840 three years earlier. In 1966 in fact, almost four-fifths of the nation's universities and colleges received some form of federal support.

Support for academic science increased from \$1.3 to \$2.2 billion during the period. Spectacular as this increase appears, it is outshone by the tenfold rise in nonscience spending, from \$85 million to \$847 million (see chart). The Office of Education's program to provide aid for construction of new facilities in developing universities and colleges accounted for most of the rise.

The change in geographical distribution of federal money is as marked as the change in the fields benefited. All 50 states and the territories had increases between 1963 and 1966, but the marked increases went to the "growth" states—Texas, Florida, and California—at the expense of the Northeast. Indeed, M.I.T. lost its rank as the largest recipient of federal funds to the University of Michigan, \$63 million (up from \$53.75 million) to \$66 million (up from \$45 million).

Broken down among the individual agencies, M.I.T.'s 1966 total came from the Department of Defense (\$35 million), National Science Foundation (\$8.7 million), N.A.S.A. (\$7.7 million), the Department of Health, Education and Welfare (\$7.5 million), and the Atomic Energy Commission (\$3.98 million).

The National Science Foundation, which published the survey of federal aid for the Office of Science and Technology, is at pains to insist that broad trends should not be read into a single year's figures. M.I.T.'s drop to second place in federal funds, says the report, "resulted in part from a reduction of support by the Department of Defense for development of an inertial guidance system and in part from reporting of major obligations on long-term contracts by the Department of Defense in the earlier years."



U.F.O.'s under the Mat

Has the Air Force intentionally concealed reports of sightings of unidentified flying objects? A number of respectable scientists have recently voiced this question, and last year, in an attempt to allay widespread suspicion, the Air Force set up a broad investigation into U.F.O.'s headed by physicist Edward U. Condon of the University of Colorado. But, according to James E. McDonald, S.M.'45, Dr. Condon's panel is taking the wrong approach and interviewing the wrong people to obtain a balanced view of the U.F.O. phenomenon.

Dr. McDonald, addressing the Boston Chapter of the American Meteorological Society at M.I.T. this fall, contended that the Air Force has deliberately played down U.F.O. sightings as a matter of policy. As evidence he quoted a recommendation of a U.F.O. investigation panel set up by the Air Force in 1953, after the unprecedented wave of sightings in July, 1952. The Central Intelligence Agency, said Dr. McDonald, asked the panel to recommend that the Air Force "debunk flying saucers . . . to decrease public interest in them." After the report appeared the number of sightings made public by military personnel dropped spectacularly. This report has only recently been declassified, and even now the Pentagon has not released it.

Two Air Force regulations quoted by Dr. McDonald lend strong support to his contentions: one states

Electromagnet and mounting developed at the National Magnet Laboratory to guide a small magnet through veins and arteries of experimental animals, and eventually of humans. The electromagnet locates the small magnet precisely in the vascular system; a catheter attached to it is used to collect blood samples for analysis or to introduce drugs, tracer isotopes and other devices into the body. Researchers at Massachusetts General Hospital have been testing the arrangement on rabbits and hope to use it in humans.

blantly that "the number of unidentified objects shall be reduced to a minimum," while another threatens personnel who report sightings publicly with a fine of \$10,000 or 10 years in jail. Dr. McDonald admitted to *Technology Review* that he does not believe the Air Force would take such punitive action, but he feels that the regulation discourages careful reporting and publicity.

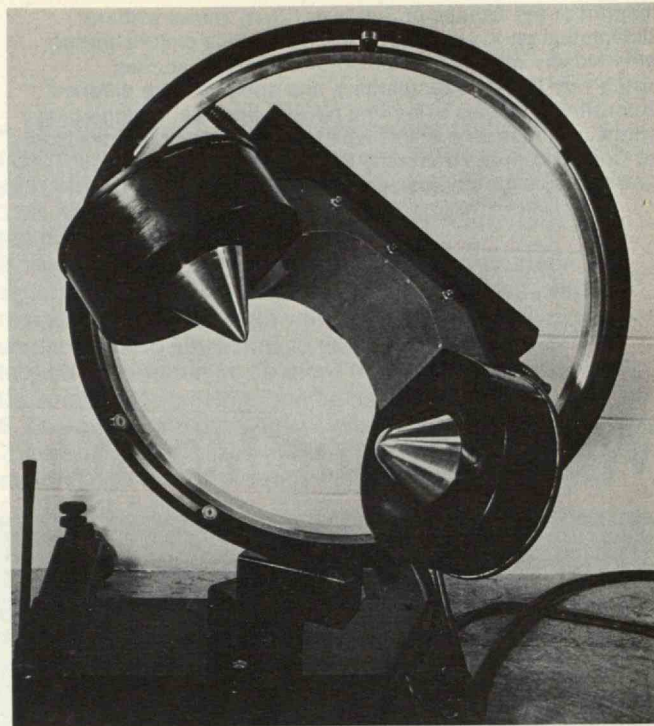
Even the Condon investigation may be unconsciously loading the odds against a fully rational approach to U.F.O.'s. Dr. McDonald expressed his belief that the panel is giving too much time to the obvious cranks, who claim to have spoken to alien visitors and taken joy rides in their spacecraft. He fears that the panel, confronted by this totally irrational evidence, may ignore the many reported sightings by competent and reliable meteorologists, astronomers and other scientists. If it does, the panel's conclusion will inevitably support the Air Force's public posture of indifference.

In Dr. McDonald's view, U.F.O.'s may well become the number one problem of world science. He first moved into this field 18 months ago, to satisfy his curiosity. After a few weeks of investigation, he "rapidly changed from casual interest to really intense interest in the problem."

Vascular Navigator

Experts in magnetism are among the newcomers in the merging of the physical sciences, engineering and medical problems. The development of a magnetic substitute for barium sulfate as a contrast material for x-ray studies was reported to the recent International Congress on Magnetism in Boston (see *Technology Review*, Nov., 1967, p. 57). Now a collaborative effort between the Massachusetts General Hospital and M.I.T.'s National Magnet Laboratory has produced a system for guiding small permanent magnets through blood vessels; the technique has potential application in diagnosing disturbances in the body's circulatory systems, in collecting samples from the body for analysis, and in placing drugs, tracer isotopes or special devices in precise positions in the body.

The new magneto-medical process has been developed by Dr. Shyam B. Yodh of the Massachusetts General Hospital, Norton T. Pierce, '47, a consultant to the National Magnet Laboratory, and Robert J. Weggel, '64,



and D. Bruce Montgomery, '56, both of the National Magnet Laboratory. The team will report the new technique in the *Journal of Medical and Biological Engineering*.

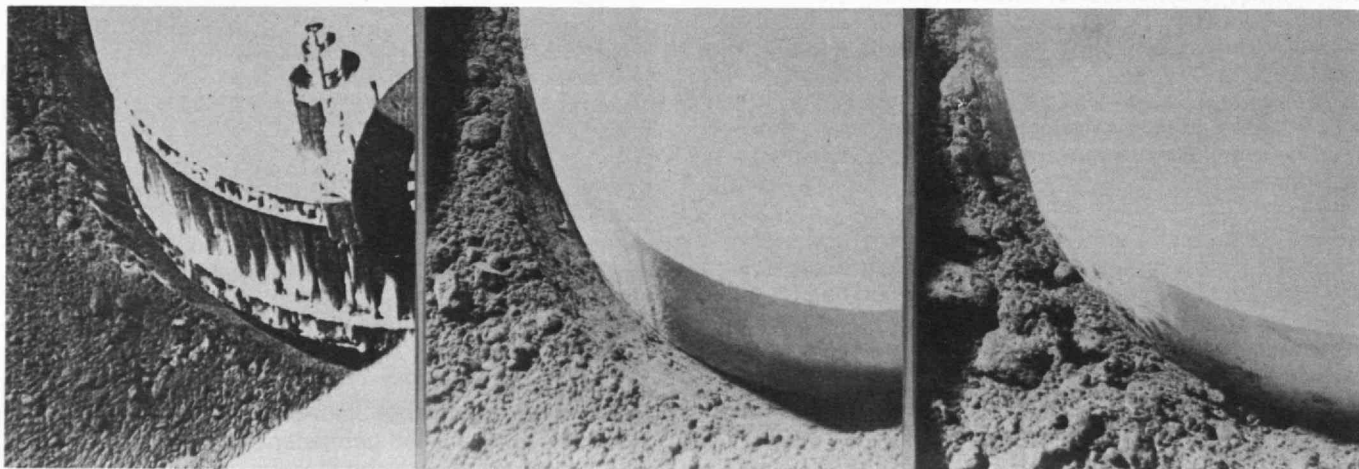
The system uses a large electromagnet (see picture, above) to guide a small permanent magnet of a platinum-cobalt alloy through veins or arteries. This magnet can trail behind it any number of small devices intended to be lodged in the blood vessels. Generally, a flexible catheter of Silastic tubing will be attached to the magnet; through this the doctor will be able to introduce fluids at precise points in the blood vessels.

After evaluating the magnet and catheter in a model of the main arteries of the brain (using running tap water to simulate the blood flow) the team turned to preliminary experiments on the vascular systems of rabbits. The magnet proved fully maneuverable and easily controllable at the many branches in the vascular system. At present there is some difficulty developing enough force on the smaller magnets to pull the catheter around multiple bends in blood vessels, but the engineering-medical team believes this can be overcome by stepping up the power of the electromagnet.

Its developers foresee three immediate applications for the device, which is about to undergo preliminary tests on humans. It should make possible the injection of congealable plastic through the catheter to block off vessels feeding blood-vessel malformations in the brain; secondly, weak "blebs" in blood vessels (known as aneurysms) of the brain could be obliterated by injecting congealable plastic or by detaching a small permanent magnet in the bleb and injecting through the catheter iron particles which would adhere to the magnet; and finally the magnet and catheter should allow doctors to inject anticancer agents closer to the spots where they can destroy brain tumors without causing harmful side effects in the healthy parts of the brain.

Imprint of the footpad of *Surveyor I* (left) shows a sharp indentation on the surface of the Moon. This picture agrees very closely with that produced by simulation studies using very fine powder (center), and appears quite different from similar studies using fine powder and coarse aggregate (right). Comparisons of this type leave Professor Thomas Gold of Cornell convinced that the Moon's surface consists of fine particles of rock material.

Water on the Moon?



On the evidence of the *Surveyor* photographs, the surface of the moon consists of fine particles of rock material. And certain features in the *Lunar Orbiter* photographs suggest that sub-surface rivers may have flowed on the moon at some time in the past.

These views were put forward by Thomas Gold, Professor of Astronomy at Cornell University and controversial originator of the so-called dust theory of the lunar surface, in a lecture to M.I.T.'s Department of Physics. He remains adamant that this year's photographic findings are entirely consistent with his interpretation of the composition of the moon's surface.

Professor Gold stressed that dust in the lunar sense has very different properties from the dust we know on earth. In the vacuum of the moon, small particles with diameters of about 10 microns would tend to weld together, to produce a surface rather softer than a sandy beach. Close-up photographs of the imprints produced by the feet of *Surveyor* vehicles, contends Professor Gold, support this view of the surface.

One of the *Surveyor I* photographs shows that the vehicle's footpad sank about one and a half inches into the surface when it settled on the second bounce. The edge of the footpad's indentation appears very sharp—a condition which occurs only if the surface is composed of fine particles, according to simulation studies in Professor Gold's laboratory.

An obvious objection to this interpretation is the presence of lumpy material near the footpad. However, Professor Gold has shown that bullets shot into very fine powder (of six microns diameter) cause the

powder to coagulate into just such lumpy "rocks"; presumably a similar process occurred when *Surveyor I* landed on the moon.

A further piece of evidence for a powdery moon came from a *Surveyor III* photograph, which showed that the honeycomb structure immediately above the aluminum base of the footpad imprinted itself on the lunar surface. Laboratory work again has shown that this occurs only if the surface consists of fine powder.

The possibility that water flowed beneath the lunar surface in some past epoch is less well substantiated, but, according to Professor Gold, provides a consistent explanation for a number of observations. The idea gains support from features in *Lunar Orbiter* photographs which appear to be the result of erosion similar to that of rivers on earth. Professor Gold's suggestion is that water might have risen from deep below the lunar surface and flowed on the surface of a layer of ice below the moon's rocky crust. Eventually the rocky material at the surface collapsed into the channels left by the water, to produce a similar pattern of lines on the surface itself.

Enterprise Engineers

The engineer of folklore is almost extinct. But according to Jay W. Forrester, S.M.'45, Professor of Management at M.I.T., he is neither obsolete, nor even unwanted.

Indeed, Professor Forrester told the National Academy of Engineering this fall, the "enterprise engineer," cast in the mold of the "professional engineer of folklore," is needed now more than ever before "to resynthesize the fragments caused by the specialization of other men."

Professor Forrester contended that most of today's engineers still see themselves in the image of the past—meeting with corporate executives, accepting individually or with associates the responsibility for designing a complex system to meet a human need, supervising construction, keeping the program within its budget, and personally assuring its satisfactory operation.

But in today's real world, the engineer is a corporate employee, a cog in the corporate machine which is interchangeable with many others. "The engineer who at one time was the educated and elite leader in matching science to society," Professor Forrester declared, "is fast becoming just another member of the industrial labor pool."

Why? For several reasons, according to Professor Forrester:

1. Engineering has become so preoccupied with science that it fails to focus on "the more fundamental objective of bridging between isolated compartments in society."
2. Today's engineer works in an environment of bureaucracy, in which personal responsibility is subdivided, men made anonymous, and individual mobility reduced.
3. Today's engineering education, totally lacking in "experiments that depart radically from classical educational procedure," is in fact designed to "suppress nearly every characteristic which the future needs in a professional engineer." Problems are predetermined and assigned; academic bureaucracies cannot yield to student innovations in style, goals, pace, and educational method; there is no commitment for continuing career guidance; full-time study is increasingly prolonged at the expense of practical experience; education concentrates on methods, not consequences.

To fulfill his role as unifier and synthesizer, the new "enterprise engineer" must understand theory as a guide to practice, must concern himself especially with human organization because "the pace and success of technology are becoming more dependent on interaction with the social system and less on scientific discovery."

We do not know how to train this new breed of professional, but "an entirely different kind of educational institution" will surely be needed. These will be among its characteristics:

1. Quality will take precedence over quantity.
2. Social, economic, and organizational studies will have equal balance with physical science.
3. Personality characteristics and demonstrated engineering accomplishment rather than academic grades will determine admission to the institutions.

4. The educational program will be continuous—a tapered transition from 100 per cent study in the first year after high school to 25 per cent study and 75 per cent work at age 27 and 25 per cent study throughout the balance of the career.

5. Physical science research will be subordinated. "The argument that education must rest on the most recent research is incompatible with enduring education; the student should learn how to work effectively even though he commands no more than a small fraction of the knowledge which might be useful."

6. The academic grading system will be discarded.

7. Learning sequences will be much more flexible, depending more than today upon the individual sense of needing a particular subject at a particular time.

8. The educational process, and career guidance as well, will become truly "lifetime" undertakings, and new tuition plans will assure that a student ultimately pays the continuing cost of his education.

Professor Forrester's remarks will be published in full in the *Proceedings* of the fall meeting of the National Academy of Engineering.

Mini-Reactor Physics

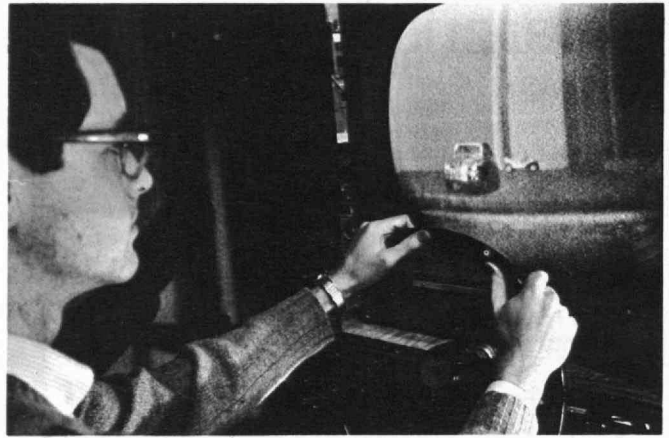
A new method of studying the reactor physics of large reactors on a small scale (based on analysis of single rods or small clusters of them) promises an inexpensive way to develop new reactor designs and fuels.

The new technique has stemmed from an investigation into lattices of fuel rods in reactors, started in 1959 by workers in the M.I.T. Nuclear Engineering Department in a project sponsored by the Atomic Energy Commission and led by Professors Theos J. Thompson, Michael J. Driscoll, Sc.D.'66, and Irving Kaplan. The group discovered that the nuclear parameters of a very large array of reactor fuel elements in a large reactor can be successfully predicted by measuring the properties of one rod, and of a small cluster of rods. One can now confidently extrapolate to the properties of these measurements in a simple way to represent a complete reactor as large as 20 feet or more in every dimension.

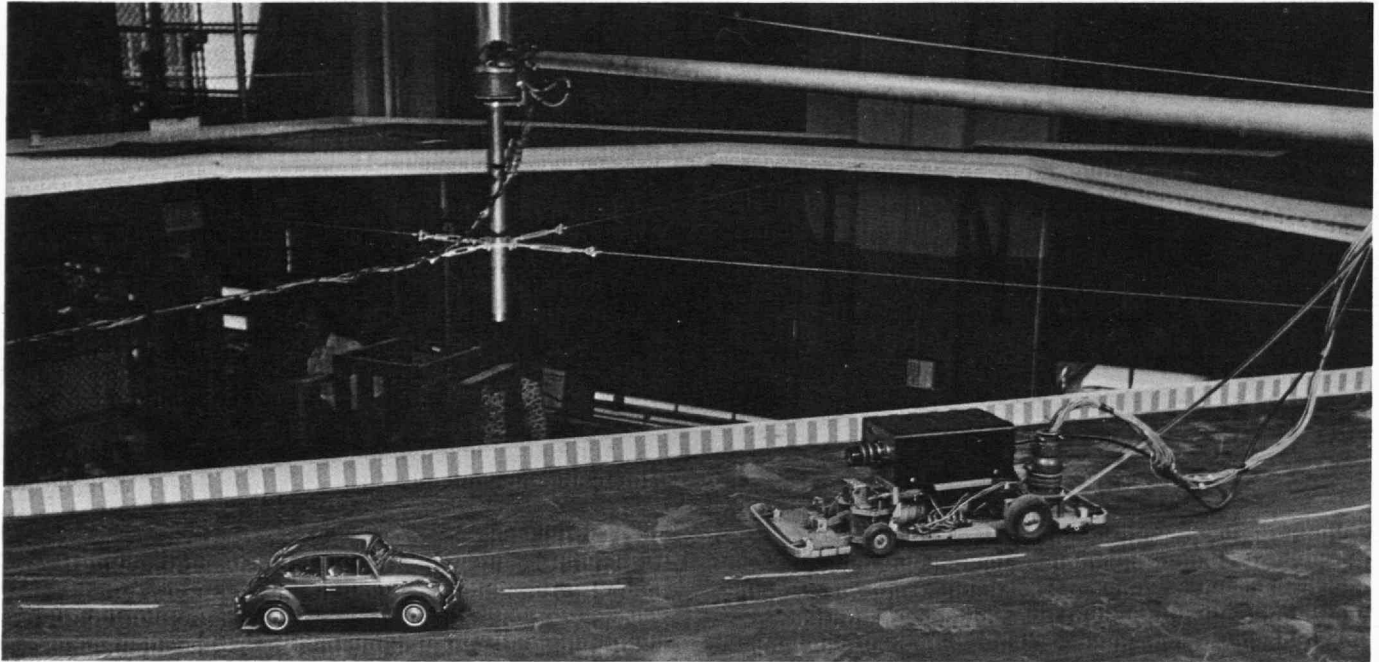
This new method has a number of immediate applications. It will enable reactor designers to experiment with fuel in very short supply, such as U_{233} , an isotope of uranium formed by the capture of a neutron in thorium and its subsequent beta decay; it will give scientists a chance to investigate in greater detail than hitherto possible the reactor physics of partially burned-up fuels; and it may open the possibility of new types of nuclear reactors.

The experimental reactor physics group of the Nuclear Engineering Department has now made a proposal to the Atomic Energy Commission to investigate the reactor physics of reactors based on clusters of fuel rods using the new techniques. Clusters of from five to as high as 30 rods in pressure tubes cooled by water form the basis of this concept; the reactor would contain several hundred or more pressure tubes separated by heavy water, the "moderator" which slows down the speed of neutrons traveling through the reactor.

Driving simulator developed at M.I.T. to focus on the reactions of the man at the wheel. The driver uses standard auto controls (right) to steer a model carrying a miniature television camera (below). The camera produces on the screen in front of the driver a picture of traffic conditions on the miniature road. At present, driving simulation of this nature is in a comparatively primitive state, but research in this field will eventually enable scientists to understand more fully the reactions of drivers, and perhaps use this understanding to reduce road accidents.



Simulating Driving



Three factors determine the safety of a vehicle on a highway: the car, the highway, and the driver. The efforts of Ralph Nader have focused attention, and stimulated action, on the automobile, the first of these. Many university and federal laboratories are examining the second—improvement of the country's roads. But the third factor—the performance of the driver on the road—remains largely a mystery to all but a few groups of engineers and social and life scientists interested in simulating and modeling man at the wheel.

Although aircraft simulation has been a recognized prelude to development of safe aircraft for 20 years, auto driving simulation is a tiny and relatively new branch of engineering science. It is agreed by most workers in the area that study of certain driving problems in the real world is simply too hazardous, and laboratory simulation with human driver subjects is the next best thing. However, even though adequate funds have been available to potential investigators very few engineers have taken the plunge into this field—and those who are in it often do not speak the same language. A conference at M.I.T. this fall sought to bring together experts in simulation and mathematical modeling of driving, under the sponsorship of the U.S. Public Health Service.

While no "consensus" was reached, the meeting did serve to show the directions, in many cases widely divergent, which groups with simulators are taking. Basic questions on what inputs should be given to the driver in a simulator, what tasks the driver should be given and how simulator performance could be compared with the driver's handling of a real car on a real road emerged as the present imponderables. Mathematical models, it was agreed, suffered from a lack of sufficient relevant inputs. That is, what the driver looks at or attends to and what other variables mostly affect his performance behind the wheel, are not understood.

Conference chairman Thomas B. Sheridan, Sc.D.'59, Associate Professor of Mechanical Engineering at M.I.T., told *Technology Review* that the state of auto simulation is still very primitive. Perhaps the greatest problem is how to measure the driver's performance without actually altering it in the process. This bears a direct analogy to the Heisenberg principle of physics, that in the very process of measuring atomic particles, the positions or velocities of the particles are themselves altered unavoidably. It may even prove necessary to train drivers to "act," i.e., to behave in simulators just as they would under normal driving conditions, though they are not under the same stress.

Anti-Environments

Everyone knows that humans are great pattern-recognizers. But in the process of seeking an established pattern to which the unknown conforms, humans add an inertial resistance to change which Arthur Porter, '39, Head of the Department of Industrial Engineering at the University of Toronto, calls "the time-constant of man."

How to reduce that "time-constant" was the subject of Professor Porter's recent remarks at a San Francisco engineering management conference of the American Society of Mechanical Engineers. His proposal: use appropriate "anti-environments."

The professional in a field tends to operate in an "environmental" manner in that field—his background and experience render him insusceptible to change. But the amateur is uninhibited by outmoded patterns and imprints, and his new approach to the problem provides the "anti-environment." "Science councils, for instance, are made up of scientists; and arts councils of artists and humanists," Professor Porter notes. "The anti-environmental approach would be to include a small minority of arts men on science councils and of scientists on arts councils."

In some fields, the computer is still "anti-environmental," says Professor Porter. But if present progress continues it will soon become part of the environment, a factor serving not change but the *status quo*. Then, says Professor Porter, "it will become increasingly clear that the physiology of digital computers is not well suited to the study of the physiology of humans or of human society."

He suggests we may need "a more anti-environmental approach to the creation of new species of information-processing systems . . . associative storage systems that operate in non-quantitative modes and handle configurations in contradistinction to numbers."

Educating the Boss

The typical graduate takes to his first job a creativity and individualism which may partly conflict with the objectives of his organization and yet bring a fresh point of view to bear on its problems. It is up to the boss to channel the graduate's abilities in a direction which avoids both outright rebellion and sterile conformity. Yet most companies neglect entirely to train their bosses to carry out this delicate task.

The proposal that companies should divert some of their funds from training new graduates to the task of training their bosses came from Edgar H. Schein, Professor of Organizational Psychology and Management in the Sloan School, in third annual Douglas Murray McGregor Memorial Lecture at M.I.T. this fall. Dr. Schein discussed the process of "organizational socialization," whereby an employer aims to create attitudes of loyalty and enthusiasm among new workers.

Studies among recent graduates from the Sloan School have shown that over half have already left their first

jobs. Organizational socialization has clearly failed, in these cases, to strike the right balance between the blossoming of individual creativity and the acceptance of certain company values by new employees.

Companies can start to overcome this barrier for their new recruits in two ways, Dr. Schein told his audience. They can ensure that the higher-level executives know just what is happening in the lower rungs of the company ladder, and they can recognize the need to help the bosses of the newly recruited graduates learn how to deal with the newcomers.

An Ecological Balance

Solution of the world food problem—"the most difficult problem the world has ever faced"—is jeopardized by continued population growth and increasing poverty. But it remains "within our power" to make a major contribution toward helping hungry peoples help themselves, Aaron M. Altschul, Special Assistant for International Nutrition Improvement to the Secretary of Agriculture, said in the Underwood-Prescott Lecture at M.I.T. this fall.

The main consequence of lack of food, said Dr. Altschul, is a self-reinforcing economic one: hunger takes away a people's energy, and so they lose the will and strength to improve their lot. But the U.S. population today consumes only 150 pounds per person—less than 10 per cent—of its annual nonanimal protein resources. A more efficient use of our present resources of plant and animal protein, resulting from a more sophisticated approach to food supply, could save future generations in underdeveloped countries who are now condemned to subnormal mental and physical power.

Dr. Altschul's approach is to use U.S. protein surpluses to enrich local diets. Already the U.S. Department of Agriculture is encouraging American food processors to study protein-rich beverages and concentrates for sale overseas. The 1970 goal is one billion cups of additional protein beverage, equivalent to adding one million tons of protein (10 per cent of the amount of protein now contributed by milk) to the world food supply.

By 1969, he said, all emergency shipments of grain from the U.S. will be fortified to the optimal extent; and by 1970 all grains exported from the U.S. and all grains processed in large urban centers in developing countries will be similarly fortified.

Dow Day at M.I.T.

Dow interviewers Robert J. Rowe and Leigh B. Bangs, Ph.D. '65, were recruiting on campus from Monday to Wednesday, November 6 to 8. Their visit was preceded by a week of intensive conversations and formal and informal decision-making in which essentially all elements of the community were represented. On Monday of that week 40 students decided to demonstrate their protest of Dow's involvement in the war (it is the government's major supplier of napalm). On the Friday before "Dow Day" some 60 interested members of the faculty met with four students who urged them to support the demonstration against Dow; faculty members reached a general consensus that civil disobedience would be a mistake in the circumstances—an attitude which may have affected the students who eventually decided on their course of action. Saturday morning half a dozen faculty members, led by Murray Eden, Professor of Electrical Engineering, formed an *ad hoc* committee with the

Came the day itself, and a rally sponsored by the M.I.T. chapter of Students for a Democratic Society and the M.I.T. Committee to End the War in Vietnam, in front of the Student Center. From there the demonstrators marched to the Placement Office and sat down—in front of the office and in the corridor outside it leading to the Alumni Association offices. Gathered to meet them were a few sign-carrying members of the M.I.T. chapter of Young Americans for Freedom, protesting the demonstration and the presence of outside agitators. (In fact most demonstrators were M.I.T. students, although a bus brought in some Wellesley girls who contrived to keep up their numbers by an intricate shift system.) Throughout the day 100 to 125 demonstrators of varying opinions filled

Throughout the day Lt. James Olivieri and five members of the Campus Patrol were on hand to keep order if necessary. The authorities had in fact set up behind the scenes, during the previous week, a blueprint for action in the event of violence, but it was never invoked in any respect. In a statement during the previous week, President Johnson had emphasized that the use of force would "infringe the rights of protesters and those who seek information about jobs, inflicting grievous damage on the integrity and the long-run quality of the academic community."



Late Monday afternoon the demonstrators voted unanimously not to escalate into an obstructive demonstration and not to return the following day; they chose instead to concentrate their efforts at polling places in Cambridge where an anti-war referendum was on the city election ballot. So they put their cigarette butts and trampled signs in trash containers and quietly departed. Drs. Rowe and Bangs, who had survived a small protest at M.I.T. in February, interviewed a total of 40 *bona fide* job prospects during their stay and returned to Michigan to commiserate with their more battle-scarred colleagues.

For many at M.I.T. the events of "Dow Day" revealed a new understanding of how a university community can achieve public discussion of public issues while respecting rights inherent in academic freedom. The day began with a rally on the steps of the Student Center and a march through the main buildings to the Placement Office, where over 100 pro- and anti-Vietnam picketers sat peacefully all day while Dow Chemical Company interviewers worked inside. Meanwhile, students and faculty joined to organize a public discussion on issues in the Vietnam war which filled Kresge Auditorium to overflowing with an animated but respectful audience.



Social Responsibilities of M.I.T.

The forum arranged to coincide with the arrival of recruiters from the Dow Chemical Company on campus was notable for the fact of its existence but it suffered from the same lack of specific direction as the sit-in (see above). That it attracted at very short notice a larger audience than Kresge Auditorium could hold encouraged many members of the M.I.T. community to believe that the Institute has at last found a forum for public discussion of social responsibilities and is beginning to take the issues seriously.

President Howard W. Johnson opened the program, which was chaired by Walter A. Rosenblith, Chairman of the Faculty. President Johnson reiterated his statement, endorsed by the Faculty Council the previous week, that the Institute respected the right of students to vigorous dissent as long as it did not infringe upon the reasonable rights of others. And he encouraged all those concerned to plan future open discussion of public issues.

Murray Eden, chairman of the *ad hoc* committee which organized the forum, was "moved and abashed by the size and character of the audience." Without pressure from the students, he continued, the faculty would not have organized such a gathering.

Red Baron for the day was Max Key, a member of Dow's Board of Directors and Director of Industrial Relations. He defended his company's manufacture of napalm on the grounds that Dow was not equipped to decide the moral issues; it was, however, "equipped to provide service to the government in continuance of the war in Vietnam." In effect, he passed the buck to the Department of Defense, which unfortunately refused to send a representative to the forum.

Dr. Frank Ervin of Harvard Medical School and Massachusetts General Hospital sketched out the history of napalm and its medical effects. Today, the U.S. uses nearly 50 million pounds of this sticky, searing weapon every month, mainly over South Vietnam, he said; it is singled out for discussion because it is

an indiscriminate form of mass destruction.

Digressing from napalm, Ithiel D. Pool, Professor of Political Science at M.I.T., distinguished two separate issues—the war and the weapons. Having spent many months in Vietnam, he feels convinced that protecting the freedom of a population is worth fighting for, and he believes that the American presence, despite the complex realities of the war, is in fact serving this purpose. He drew gasps of surprise from the audience when he reported that after several visits he had yet to see a napalm victim in Vietnam.

The wind-up speaker, Philip Morrison, Professor of Physics at M.I.T., noted that responsibility for weapons such as napalm cannot be pinned on individuals. Technologists and scientists must strive to re-establish "the feedback loop of responsibility," he said; and he emphasized M.I.T.'s special obligation in this area, for technological innovations from under its roof will have great impact on life in the future.

President Howard W. Johnson in his first annual report to the M.I.T. Corporation: "The first function of this university, like others, is to turn out superbly educated men and women, and I hold this highly individualized responsibility that characterizes M.I.T.'s learning process to be the heart of the institution." (Photo: Harry Holbrook, Boston *Globe*)



No Place to Go But Down

Howard W. Johnson has told the M.I.T. Corporation in his first annual report as President of the Institute that M.I.T. has "compelling" problems ahead. But no one, he said, can fail to have a feeling of M.I.T.'s "grand movement and effectiveness . . . its exceptional sense of relevance to its times . . . its innovative interest in the problems of society."

President Johnson focused attention in his report on nine areas of major commitment and concern, based on a special review of size, purpose, direction, needs, and expectations for the next 10 years undertaken by the Institute administration in the spring and summer of 1967. The report outlines needs of \$135 million in new capital by 1977. President Johnson told the members of the Corporation, "First positions (of leadership) are precarious because there is no place to go but down."

"The enduring twin pillars of the Institute," he wrote, "are engineering and science. It is inconceivable that the Institute should be content with less than the first rank" in these two fields. In science, Mr. Johnson noted the recent completion of new buildings for the life sciences and the earth sciences and the present construction of new quarters for theoretical physics, the Camille Dreyfus Building for chemistry, and a new linear accelerator in Essex County. In engineering, though "good progress" was made this year, "much of our hope of doing what we want to do well will depend on our ability to build new facilities" for electrical and chemical engineering and water resources.

M.I.T.'s concern for environmental studies goes far beyond the separate disciplines of engineering and science, Mr. Johnson wrote. He cited "strong theoretical work in association with strong applications" in atmospheric studies, in space research, in oceanography,

and in materials science while calling for continuing development of research and teaching in these fields.

"M.I.T. has a major concern with the nature of life and health," said President Johnson, and he reported an intensive summer study undertaken to determine how M.I.T. might organize its strong interests in the whole range of biomedicine. President Johnson also cited the recent Harvard-M.I.T. agreement to study ways of closer collaboration in medical research and education.

A faculty committee has also completed a major study of how the Institute might increase its effectiveness in the field of urban affairs, Mr. Johnson said, and "it remains to be seen whether funds will be forthcoming to support the new programs they have proposed." Clearly, he said, the Institute "has a major concern with the condition of our cities—the character of our structures, our transportation, our water resources, the pollution problems, and the management skills concerned with environmental problems."

Communication, information, and decision processes represent another important area for M.I.T. teaching and research. "There are now 20 computers on the campus," Mr. Johnson wrote, "with an annual operating budget of about \$5 million," and theoretical and applied studies in these fields enter most of the Institute's academic departments.

Another major focus of the Institute, said President Johnson, has to do with "the social, economic, political, and administrative problems of our society. At M.I.T.," he wrote, "we believe that the two tracks relating to the human and technical sides of man's advancement need to be joined ever more effectively if real progress is to be made." He cited growing contributions in economics, political science, linguistics, and psychology. But, because of the "sharply reduced level of the Sloan Foundation's support in

recent months," the Sloan School of Management is now inadequately funded.

The place of the humanities and arts at M.I.T. is secure. Their importance to the Institute stems from the broader framework which they provide "for understanding and directing the goals of science," as well as from their own intrinsic worth, Mr. Johnson wrote.

"M.I.T. is committed to research and improvement in the processes of teaching and learning," Mr. Johnson told the Corporation. "At a time when the quality of college teaching has become a matter of national concern," he said, "the energy, interest and concern devoted to good teaching by members of M.I.T.'s Faculty is exceptional. But we worry about how we can do still better."

Undergraduate education, providing a "continuous cycle of new strength and vigor" is M.I.T.'s central commitment, President Johnson said, and he pledged continuing efforts to increase the diversity and effectiveness of the Institute's undergraduate programs.

"There can be no flinching from the magnitude of the costs associated with these brave goals," President Johnson wrote, and he called for major new financial support to meet urgent new capital needs. These needs, he said, are now estimated on a 10-year basis to total \$135 million, and "future needs will require additions to this amount." Principal items were listed as \$14 million for a new electrical engineering and electronics complex, \$14 million for Faculty development, \$6.5 million for student residences, and \$2 million for student aid.

No major capital campaign is planned to achieve these goals, President Johnson assured the members of the Corporation. "Instead," he said, "we will rely on a steadily growing Alumni Fund and on an unremitting solicitation of foundations, corporations, and individuals for the resources crucial to each project."

Mathematics Department Head

Norman Levinson, '33, Professor of Mathematics, will be Head of the M.I.T. Department of Mathematics effective at the end of the current academic year. He succeeds William Ted Martin, Head of the Department for 20 years, who has asked to be relieved in order to concentrate on teaching and study. Professor Levinson holds three M.I.T. degrees—S.B. (1933), S.M. (1934), and Sc.D. (1935). He was Redfield Proctor Traveling Fellow at Cambridge University for 1934-1935 and then spent two years as a National Research Council Fellow at Princeton University and the Institute for Advanced Study. Since then he has been at M.I.T.

Professor Martin first came to the M.I.T. staff in 1936 for seven years; he returned as Head of the Department in 1946, and since then under his leadership the Department has grown substantially in both size and stature.



Norman Levinson, '33



William J. Hecht, '61

Educational Council

William J. Hecht, '61, who has been associated with United Aircraft Research Laboratories in East Hartford, Conn., has been named Executive Secretary of the M.I.T. Educational Council. He comes to Cambridge this winter to assist William H. McTigue, '54, who assumes the title of Director of the Council, in supporting over 900 alumni throughout the world who, through contacts with secondary schools, counsel students interested in the type of education offered by M.I.T.

Mr. Hecht, who studied in the Sloan School of Management at M.I.T., has worked in the field of personnel management and professional recruiting, first with the New York Telephone Company and more recently in East Hartford. At M.I.T. he will also have the title of Assistant Director of Admissions.

Toward a Sense of Fulfillment

M.I.T., which began with the concept of "relating the best minds of our youth with the most intricate and challenging problems of our society," now has three special concerns: to integrate the human and the technological aspects of learning into "a new liberal education"; to make its competence relevant to the special needs of the times; and to engage today's young

people by offering them an opportunity for truly constructive action.

These special purposes of M.I.T. were outlined by Howard W. Johnson, President, to more than 300 high school guidance counselors in Cambridge in October for the Institute's 12th Guidance Conference.

While it is true that M.I.T. "is an arch-product and a chief interpreter of the technological revolution that marks our age," said President Johnson, its concerns and commitments extend far more broadly. For now all those who will make important decisions in whatever fields of human affairs will exercise "judgments based on the physical sciences and the social sciences and the arts."

And we have special needs, he said, to develop programs which give students opportunities "for expression of creativity and energy," providing "a sense of fulfillment that appeals to our youths' hearts as much as to their brains."

In two full days as M.I.T.'s guests, the high school officers heard Faculty and student speakers describe undergraduate education and community activities and M.I.T. admissions and financial aid policies; and they were entertained by their former students now attending M.I.T. in the Institute's houses and fraternities.

A. G. Korol, 1900-1967

Alexander G. Korol, an eminent authority on technological education and the management of science and technology in the Soviet Union, who was a member of the senior research staff of the M.I.T. Center for International Studies for 13 years before his retirement in 1965, died on October 12 after a long illness.

He was, as Howard W. Johnson, President of M.I.T., said, "an exceptional man." Mr. Korol was born the son of an exile in Irkutsk, Siberia; he fled to Japan in 1920, emigrated to Seattle in 1923, studied for three years at the University of Washington, and worked in an engineering firm until 1936 when he became successively Chief Engineer, Vice President, and Manager of Hawaiian Tuna Packers, Ltd.

In 1948 he launched the new career which brought him into scholarly work at M.I.T. by attending George Washington and Columbia Universities. The first major product of Mr. Korol's research at M.I.T. was *Soviet Education for Science and Technology*, a definitive work published in 1957 at a time when Sputnik had shocked the American people into a full realization of the significance of technological education. In 1965 came *Soviet Research and Development*, a study of the organization and management of Russian scientific research.

Sustaining Private Education

Though many emphasize today's financial crisis confronting American private education, "the core needs of our private institutions are a manageable total in relation to the potentiality of private sources of funds," James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, told members of the Corporation's Development Committee at their annual meeting at M.I.T. this fall.

"The crisis confronting our private institutions is very real, and it is growing," Dr. Killian admitted. And it is "severest on those private institutions like M.I.T. that are the pacemakers and that set the very highest standards of quality," he declared.

But Dr. Killian rejected suggestions that private higher education may be "economically unsustainable" as "a serious misreading of the capacity and willingness of private philanthropy to provide the support that will be required."

Private philanthropy is especially important, Dr. Killian said, in sustaining basic, central needs, such as salaries, student aid, educational quality, and physical plant. It is funds for these, he said, that give an institution stability, flexibility, and independence, that "sustain and strengthen the heart of the enterprise."

Dr. Killian admitted that government support for private education is essential, too. But he pointed out that government sources, in general, allocate funds for additional or special activities, and only funding from private sources can "ensure that universities do not become dependent on government support."

Private institutions, he told the Development Committee, need enough private capital to "guarantee the basic independence and freedom of their educational programs."

U.S.S.R. at M.I.T.

In Boston for a Boston College exhibition on Russian education, Soviet Ambassador Anatole Dobrynin made a brief call at M.I.T. this fall. Jerome B. Wiesner (left), Provost, was his host, and the others included C. Stark Draper, '26, at Mr. Dobrynin's left, and other department heads.



The Julie Fassett Garden

The garden memorializing Mrs. Frederick G. Fassett, Jr., the late wife of the Emeritus Dean of Residence at M.I.T., will be built in a triangular plot adjacent to Baker House.

So far \$15,000 has been received in memorial contributions for the project, \$4,000 of it from undergraduates who remember what *The Tech* calls "the relaxed enjoyment that many an undergraduate experienced in the Fassett home." Plans for the garden include a wall and hedges to make the area "a haven from the austerity and intense pace of the Institute," according to the Julie Fassett Foundation Committee. Construction will begin in the spring.

Materials Science

Harry C. Gatos, Ph.D. '50, an authority on the molecular and atomic structures of semiconducting and superconducting materials, has been appointed Associate Director of the M.I.T. Center for Materials Science and Engineering.

Professor Gatos will work with Robert A. Smith, Director of the Center, in the over-all conduct of its broad and growing interdisciplinary activities in research and teaching.

Dr. Gatos was born in Greece in 1921, studied at the University of Athens and Indiana University before coming to M.I.T. in 1948 to work in the Department of Metallurgy. He was associated with M.I.T.'s Lincoln Laboratory for 10 years beginning in 1955 for work in solid state physics, chemistry, and metallurgy. From 1962, when he was appointed to the M.I.T. Faculty, to 1965, when he terminated his official connections with Lincoln Laboratory, Professor Gatos divided his time between the laboratory and the main campus.

The Horace Sayford Ford Building

Though it is known (for its former tenants) colloquially around the campus as the Daggett Building, the home office building of *Technology Review* and the Alumni Association was officially supposed to be called the Administrative Services Building.

Now it has an easier and far more distinguished name: the Horace Sayford Ford Building.

Mr. Ford served the Institute for 20 years as Bursar and then for 16 years as Treasurer and an officer of the Corporation. A plaque to be placed in the building cites him as "an administrator renowned for his resourcefulness and skill in the management of the business affairs of M.I.T., a pioneer in sensing and meeting the financial needs of generations of Institute students." He was, said Howard W. Johnson, President of M.I.T., "one of the Institute's most gifted and constructive administrators."

Upon his retirement in 1950, Mr. Ford was cited by the Eastern Association of College Business Officers as the "best financial officer in American education." In naming the building in his honor, said President Johnson, "we recognize the devotion and high quality of Mr. Ford's distinguished service to M.I.T."

The announcement of the naming was made at luncheon following the annual meeting of the M.I.T. Corporation. Mr. Ford, unable to attend, was represented by his wife.

Wellesley, Here We Come

While a student-faculty committee ponders the mechanics of the Wellesley-M.I.T. undergraduate cross-registration plan announced last spring (see *Technology Review*, June, 1967,

p. 68), four students are giving the plan a trial run:

Jane Carter, a senior history major at Wellesley, is interested in city planning, and she is enrolled in an M.I.T. seminar.

James C. Liang, '70, wanted to study Chinese, which is not taught at M.I.T.; so he commutes four times a week to Wellesley, where, he told *The Tech*, his instruction is "excellent."

Alfred A. Singer, '68, a philosophy major, is taking a Wellesley seminar on Kant. His only complaint is that Wellesley students are "too punctual with assignments for the M.I.T. frame of mind," but he admits that "walking into a classroom full of girls is an enjoyable experience."

Anne Tetty commutes to M.I.T. three times a week for an advanced linguistics course which she says adds important perspective to her Wellesley German major.

The committee at work to develop the Wellesley-M.I.T. exchange plan includes students and faculty from both schools. The only comment to date is from Cordelia Swain, a Wellesley student member of the committee, who told *The Tech* that she hoped the plan would extend to extracurricular affairs. "There just aren't any boys" at Wellesley for such activities as choir, orchestra, or drama, she said.

A \$200-Million-Year

For the first time in its history, total operations of the Institute exceeded \$200,000,000 in 1966-1967. There were marked increases in educational expenses, sponsored research outlays, and special laboratories' operations, Joseph J. Snyder, '44, Treasurer of M.I.T., told members of the M.I.T. Corporation in his annual report for the year ending on June 30, 1967.



Abramowitz Ballet

A unique combination of discourse and dance filled Kresge Auditorium for two performances of the Abramowitz Memorial Lectures this fall. The discourse was a lecture on Stravinsky's ballet "Apollo" by B. H. Haggin, an eminent critic. *The Christian Science Monitor* said his "brilliant" lecture "immensely enlarged the spectators' appreciation" of the full performance of the ballet as choreographed by George Balanchine. The performance was by Edward Villella and Patricia McBride of the New York City Ballet assisted by five Boston ballerinas with piano accompaniment by Robert Irving (right in the picture), conductor of the New York City Ballet. The lectures were made possible by the gift of William L. Abramowitz, '35.

Principal among the increases in Institute operations, Mr. Snyder said, were the growth of basic research, several international programs, new curriculum development, and the growth of computation and library services. New activities in the Instrumentation Laboratory were largely responsible for the growth of the special laboratories' operations.

The increased general expenses were financed by additional tuition, by contract allowances, by increased use of gifts and investment income, and by direct grants of more than \$1.7 million.

Gifts to M.I.T. in 1966-1967 were just over \$16 million, down substantially from nearly \$40 million in 1965-1966. Two non-recurring gifts—a large foundation grant and the bequest of Alfred P. Sloan, Jr., '95,—resulted in the unusually high total in 1965-1966.

There was a large increase in the Institute's endowment funds in 1966-1967, the result of transfers of building funds into endowment for maintenance of new M.I.T. physical plant. Over two-thirds of M.I.T.'s \$120-million-endowment was invested in common stocks at the end of the year.

New construction increased the value of the M.I.T. plant from \$96 million to nearly \$108 million during 1966-1967, according to Mr. Snyder's annual report.

Dinner with Sylvia

Before the folk-singing team of Ian and Sylvia finally went on stage in Kresge Auditorium this fall, most of Baker House had been involved in making their sound sound right.

It all began when Ian and Sylvia arrived without a bass amplifier. Alvin F. Sellers, Jr., '70, volunteered the amplifier he finished building late in the

summer, called Superbass; but the bass player's bass didn't match up with Superbass. So a second bass amplifier, called Jugmobile, was pre-empted from Baker's Bushkoff-Brown Blues Band, and finally every instrumentalist in the Ian and Sylvia group pronounced his Kresge sound satisfactory.

Then they added the Kresge sound system for Ian and Sylvia's voices, and Sylvia said it sounded "like a skating rink." Another hurried call yielded a public address system for Baker's Frumious Bandersnatch Band.

Alvin Seller's reward was dinner with Sylvia after it was all over.



Ian and Sylvia, young Canadian folksinging team, perform their "sometimes original" compositions for an enthusiastic audience at Kresge Auditorium. (Photo: Larry-Stuart Deutsch, '67)

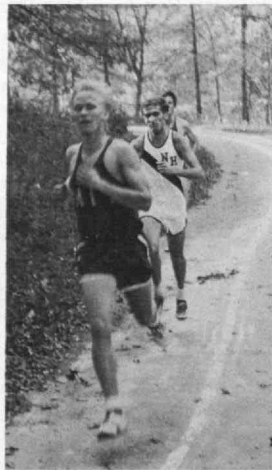
Design to Prevent Crime

Sociological spin-off in the form of new anti-crime aids has resulted from an M.I.T. course in Mechanical Engineering Design. Screaming electric typewriters, revolving doors to trap unwary burglars, and wiring systems for doors and windows which would silently inform police of attempted break-ins turned up among the ideas of 50 juniors who last spring term took the course headed by Robert W. Mann, '50, Professor of Mechanical Engineering.

The anti-crime devices exist only in conception. The students translated their ideas into design drawings but did not take the larger step of producing the hardware (although there is no reason why the ideas should not eventually find some practical outlet).

The main value of the course lies in its exposure of students to real-life engineering problems. Igor Paul, '60, Assistant Professor of Mechanical Engineering at M.I.T., who led the teaching team, stressed this aspect in a paper he presented to a National Conference on Engineering Design and Design Education at Dartmouth College in July. The course, he stated, "subjects the student to what is now commonly termed 'authentic involvement' in engineering."

Many different subjects have been at the core of M.I.T.'s successive design courses, but the general format has remained the same. The students are presented with a broad theme of topical interest and asked to develop methods of attacking the specific problems arising from it. Lectures by guest experts give the students a broad framework for their solutions. Small groups then tackle specific aspects of the theme, and at the end of the course face interrogation on their designs by a panel of yet more experts in the field. Professor Paul emphasized that the content of the course is continually open to modification in the light of experience.



All kinds of M.I.T. people were on top of New Hampshire's Mt. Monadnock this fall in a rebirth of an old Columbus Day tradition. (Photo: Jeffrey M. Reynolds, '69)

It was four to three when the whistle blew to end the Worcester Tech-M.I.T. soccer game in October, but when the season ended the record was only two wins in 11 starts. (Photo: Michael S. Venturino, '70, from *The Tech*)

Sigma Alpha Epsilon won the 1967 M.I.T. intramural football crown, and Bruce C. Wheeler, '70 (fullback), and Terry D. Bennett, '70, are two reasons why. (Photo: Jeffrey M. Reynolds, '69, from *The Tech*)

James R. Yankaskas, '69 (in action above against the University of New Hampshire) was captain of the 1967 cross-country team, the best in M.I.T. history with an 8-0 season record. (Photo: William Dix, '71, from *The Tech*)

Individuals Noteworthy

Recipients of Special 50th Anniversary Awards of the American Institute of Planners were **Frederick J. Adams**, M.I.T. Professor of City Planning, Emeritus, and **Kevin Lynch**, '47, M.I.T. Professor of City Planning. Professor Adams was cited for "achievement and contribution in planning education," and Professor Lynch for "achievement and contribution in planning and design theory."

Robert L. Bishop, Dean of the M.I.T. School of Humanities and Social Science, is a member of an advisory committee to the Massachusetts Board of Higher Education. Participating in the National Aeronautics and Space Administration awards program this fall was Deputy Administrator **Robert C. Seamans, Jr.**, Sc.D.'42, when **Raymond L. Bisplinghoff**, Head of the M.I.T. Department of Aeronautics and Astronautics, received N.A.S.A.'s Distinguished Service Medal, and **Charles S. Draper**, '26, Director of the M.I.T. Instrumentation Laboratory, was presented with the Distinguished Public Service Medal. Professor Bisplinghoff was also honored this fall by election as an Honorary Fellow of the American Institute of Aeronautics and Astronautics. Dr. Draper is a member of the Advisory Committee to the U.S. Environmental Science Services Administration.

Thomas D. Cabot, Life Member of the M.I.T. Corporation, is Chairman of the Executive Committee of Harvard's Board of Overseers. **John W. Cahn**, Professor of Metallurgy at M.I.T., has received the S. B. Meyer Award of the American Ceramic Society for his thesis on "The Oxidation of Isotopically Labelled Hydrazine." **David M. Epstein**, Associate Professor of Music and Conductor of the M.I.T. Symphony Orchestra, has received a 1967-1968 award of the American Society of Composers, Authors and Publishers. A.S.C.A.P. cited the "unique prestige value" of Professor Epstein's compositions.

C. Richard Soderberg, '20, M.I.T. Institute Professor, Emeritus, has been awarded honorary membership in the American Society of Mechanical Engineers at its 1967 winter meeting in Pittsburgh, Pa. **Augustus B. Kinzel**, '21, received an honorary doctor of engineering degree and delivered the principal convocation address in celebration of the sesquicentennial of engineering at the University of Michigan in the fall of 1967. **William Webster**, '23, received the Atomic Energy Commission Citation for outstanding service in the nation's atomic energy program. Cited were "his foresight and leadership in the use of nuclear energy to produce electric power."

Harold L. Hazen, '24, Foreign Study Adviser at M.I.T., and **David A. Shepard**, '26, of the Institute's Corporation, were members of the Study Commission which was instrumental in forming Case-Western Reserve University.

John B. Goodenough of M.I.T. Lincoln Laboratory was honored at a special dedication ceremony of the new Talence-Pessac campus of the University of Bordeaux, France, when the degree of *Docteur Honoris Causa* was bestowed on him.

Edwin H. Land, Visiting Institute Professor of M.I.T., has been elected a Trustee of the Ford Foundation, and for his "distinguished work in optics" Dr. Land received the Frederic Ives Medal of the Optical Society of America. The M.I.T. chapter has received a Peterson Significant Chapter Award of the **Sigma Chi** national fraternity, recognizing the chapter's excellent record in all phases of fraternity activity.



Huston Smith



John B. Goodenough

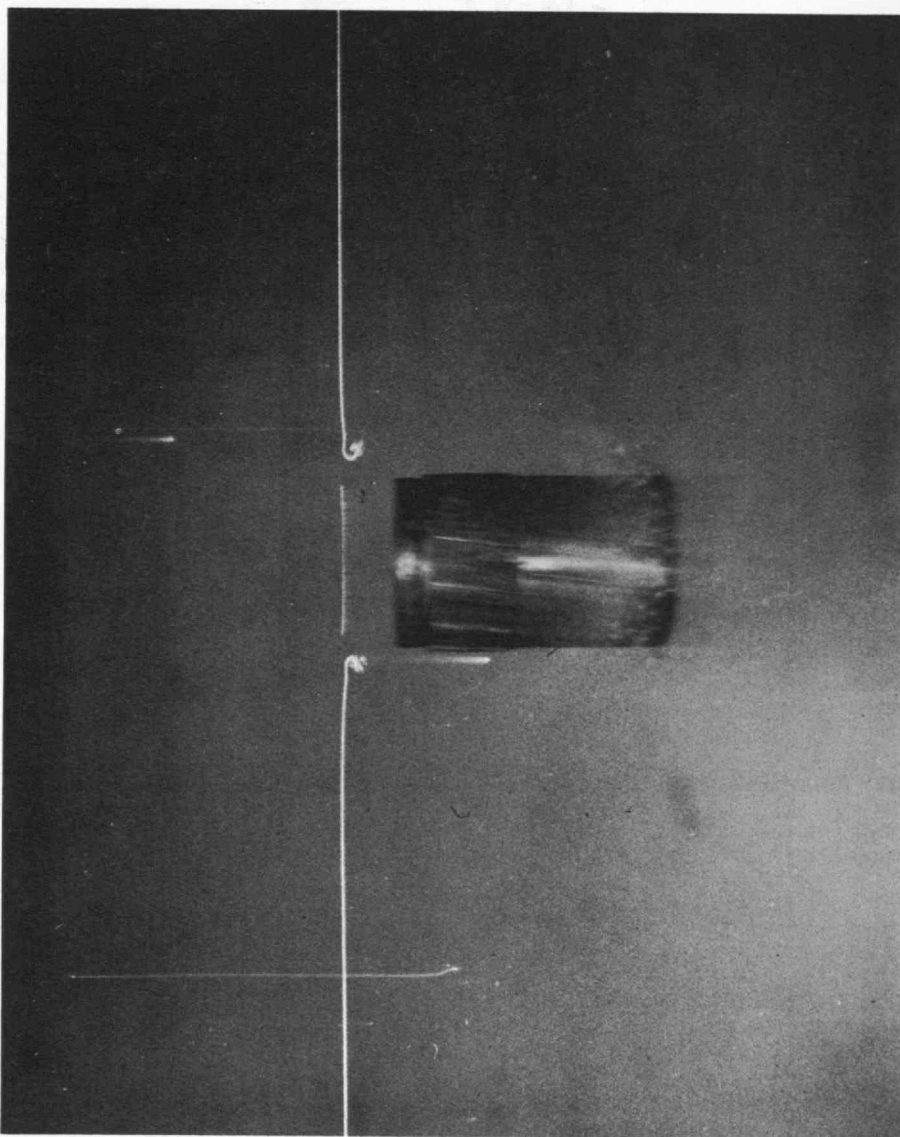
John C. Slater, Institute Professor, Emeritus (Physics), received the 1967 Irving Langmuir Prize of the American Physical Society in recognition of "his penetrating analysis, by calculations of his own and of many students he guided, of the mechanisms which bond atoms in molecules and solids." For the academic year 1967-1968, **Huston Smith**, M.I.T. Professor of Philosophy, has been appointed Phi Beta Kappa Visiting Scholar. Recently he received an honorary degree from MacMurray College. **Dr. George W. Thorn**, a member of the M.I.T. Corporation, holds the American Therapeutic Society's 1967 Oscar B. Hunter Memorial Award.

Samuel N. Alexander, S.M.'33, has been selected to receive the 1967 Harry Goode Memorial Award from the American Federation of Information Processing Societies. The award is granted for his "effective pioneering in the introduction and exploitation of computers in the Federal Government." Mr. Alexander is Senior Research Fellow, National Bureau of Standards. **Arra S. Avakian, '33**, is this year's recipient of the Sarafian Award of the Armenian Student Association. A Deering Milliken, Inc. plant in Laurens, S.C., has been named in honor of **Edwin R. Gilliland, Sc.D.'33**, Head of the Department of Chemical Engineering at M.I.T. He has served the firm as a consultant for the last eight years. **Athelstan F. Spilhaus, S.M.'33**, who has performed pioneering work in oceanography and in the space sciences, is now President of the Franklin Institute.

Robert H. Winters, '33, Canadian Minister of Trade and Commerce, received Dartmouth College's honorary degree of doctor of laws of commencement exercises at which he was the principal speaker.

Strobe Probe

Harold E. Edgerton, Sc.D.'31



Mystery Photograph

The string that is not there! A 37-mm. blunt nose test slug at a 4500-foot-per-second velocity has just clipped a string. Why is the string apparently still there?

Answer: Light was emitted by the impact of the bullet on the string, thus taking its own photograph without the aid of the strobe. In fact, this is the way in which the phenomenon was checked later.

Puzzle Review

Allan J. Gottlieb, '67

By now you have probably all heard of Harvey M. Friedman, Ph.D. '67, the boy-wonder who received his doctorate in math from M.I.T. before he turned 19. I'd like to give you my rather personal account of this story. If you notice a tinge of envy, you might remember that I am a 22-year-old first-year graduate student.

During second term sophomore year at M.I.T. I was feeling quite proud of myself. Taking three upperclass math courses, I was sure no one could do better. One day, during logic class, I noticed a rather young looking handsome "little guy" in the front, who knew the material so well it seemed he should be giving the course, not attending it. Upon inquiry I ascertained that he was a freshman, a lad of merely 16, who was enrolled in all three of my math courses—plus a graduate course to boot. I was duly impressed (and my bubble was permanently collapsed). The next year, when "Puzzle Corner" first appeared in *Tech Engineering News*, I again found my math courses to be a very proper subset of Harvey's. But something strange happened. The "little guy" began to read my column avidly. He answered most of the problems and posed several hard ones of his own. With this common meeting ground we became friends. He seemed to enjoy having his problems printed, and I certainly benefitted from his "lectures" on some of the cooler aspects of logic. Sometime during that winter Harvey became very involved in some deep aspect of logic and "there was one week where [he] made a significant discovery nearly every day," he wrote me. Sometime during this year he was officially reclassified as a graduate student.

My closest contact with Harvey came during reading period that spring. We'd spend all day in the library worrying a little about 18.242 and a hell of a lot about 18.36 (if I only studied as much as I worried about not studying . . .), and discussing life in general. It was during this week and a half that I began to really appreciate Harvey's good-natured attitude. Last year results poured forth and the "little guy" began to correspond with a few of the leaders in American logic. As a result he flew through (perhaps "by" would be more appropriate) M.I.T. grad school and is currently an assistant professor at Stanford.

That, very sadly, brought to a close my only acquaintance with a prodigy. I'll probably never meet Harvey, nor anyone like him, again, and I don't know if the "little guy" still reads this column.

But if he does, I'd like to dedicate this current installment to him. Thank you for letting me into your life, Harvey—thank you very much.—Allan

Enough for nostalgia. Let's have some problems:

Problems

5 Will someone please tell John P. Rudy, '67, whether π^e is greater than, equal to, or less than e^π . Congratulations, Janice.

6 All you origami—geometry experts might try this one from John B. Nugent, '37:

1. Take a strip of paper with parallel edges.
2. Tie an overhand knot making sure there is no looseness where the free ends "leave" the knot.
3. Hold it up to a light source and observe all but one diagonal of a five-point star.
4. Do the five points determine a *regular* pentagon?

7 and 8 The next two problems come from Donald E. Savage, '54, who writes that though he is a "Course VI type," he enjoys mathematical puzzles, especially if they are a bit off-beat. Here, he says, are a couple of "weird" puzzles he dreamed up a few years ago:

Presumably few who have studied calculus would have difficulty solving the differential equation:

$$dy/dx = y, y(0) = 1.$$

But what is the solution if one makes a slight(?) change in the differential equation:

$$dy(x)/dx = y(x - 1), y(0) = 1.$$

Note: $y(x - 1)$ should be read "y of $(x - 1)$;" that is, find the function y such that the slope at any x equals the function at any $(x - 1)$. An alternative way of writing it might be:

$$dy/dx|_x = y|_{x-1}, y|_0 = 1.$$

Using this idea of writing differential equations in which the derivative is evaluated one place and the function some other place, one can go on to invent problems *ad libitum*. May I suggest:

$$dy/dx = y(x^2), y(0) = 1$$

or

$$dy/dx = y[y(x)], y(0) = 1.$$

Note, again, that the above should be read y of x^2 and y of y of x, respectively.

Throughout the ages mathematicians have devised answers to problems that the nonmathematician might be tempted to believe had no answer. For example, when the question, "What is 3 minus 5?" was first asked, the nonmathematician presumably answered that there isn't any answer. But some mathematician apparently decided "minus 2" was a good answer. Much later when asked what is the number "x" such that $x^2 = -1$, the nonmathematician presumably said that there isn't any, but some mathematician decided "i" was a good answer. (*Somewhat of an oversimplification—Ed*) Therefore I, the non-mathematician, wish to ask this question of the mathematicians: I have heard about the first derivative of a function, I have heard about second derivatives, I have heard about third derivatives, etc., but what is a $1/2$ derivative? Or how about a π th derivative, or even an ith derivative?

9 Here's one I just solved for my topology course under Aldridge Bousfield, '63:

Let Y be the comb space
 $Y = \{(x, y) \in \mathbb{R}^2 \mid 0 \leq y \leq 1 \text{ and } x = 0, 1/n \text{ for } n \geq 1\}$
 $\cup \{(x, y) \in \mathbb{R}^2 \mid y = 0 \text{ and } 0 \leq x \leq 1\}$

Prove Y is not contractible relative to $(0, 1)$.

Speed Department

SD3 George A. W. Boehm submitted the following:

Given: an elimination tournament with 57 entries. If you arrange the bracket (with necessary byes) in the optimal way, how many matches will be played?

Better Late Than Never

Problems from last year for which solutions have recently arrived include:

23 Douglas J. Hoylman, '64, and Eric Rosenthal. (Thanks for the good wishes, and I have found someone to keep up the column—me.)

25 Frank G. Smith, '11, submitted a simpler proof.

68 Edmund Blau, Norman D. Davis, '64, and L. William Sardes, Jr., have pointed out errors in Mr. Ho's solution.

72 A partial solution was sent in by Robert Mullen, eighth grade East Prairie Eleamety (sic) School, who includes an illuminating exsampil (sic). Keep up the good work, Bobby; in a few years I hope you will be sending in some problems, too.

79 Mr. Rosenthal and George Schnitzler, '21.

81 Steven R. Gordon, '70, and Pauline Orwin (wife of Milton O. Orwin, '23) found a flaw in the published solution. The following letter from Jeffrey S. Passel, '69, President of the M.I.T. Bridge Club, clears up the mystery entirely:

I have enjoyed your column ever since I've been reading *Tech Engineering News*. I usually cannot work the math problems, but I enjoy trying. The ones I enjoy most are the bridge problems, and I would like to see more of them. One thing, however: the solution you printed to last April's bridge hand (81) is incorrect. The hand is:

♠ K 10 7	♠ 5	♠ 8 6 4 3 2
♥ 9	♥ 8 5	♥ Q 7 6 5
♦ Q 10 8 3	♦ A K 7	♦ J 6 2
♣ Q J 10 9 7	♣ A K 8 6 4 3 2	♣ 5
♠ A Q J 9		
♥ A K J 10 4 3		
♦ 9 5 4		
♣ —		

The solution as printed is:

North to win first club, South throwing diamond. Trump finesse. Spade ruffing finesse, Club ruff (East is assumed to discard a spade). However, if East throws a diamond, he will beat the hand, as follows: Diamond to the ace. Club ruff (East throwing his last diamond). South must now lose a trick (via a ruff when he tries to get on the board with a diamond or just losing a trump trick).

The proper solution is more complex and involves two complex lines of play, as follows: North wins ♣ A, throwing diamond. North leads ♣ K. East has three choices:

1. East trumps, South over-ruffs. South leads ♠ A and ♠ Q, ruffing out West's king. Then a trump finesse. Trumps are

pulled and south wins the remainder. 2. East throws a spade. The hand becomes a trump coup. South must ruff the ♣ K! ♠ A and ♠ Q ruffing if covered, leading another if not covered. Trump finesse. Cash remaining high spades. Diamond to ace. Club from board (if East ruffs, overruff, pull trump, and claim—East should throw diamond) ruff. Diamond to board, leading to this position:

♠ —	♠ —
♥ —	♥ Q 7
♦ 7	♦ —
♣ 8	♣ —
♠ —	
♥ K J	
♦ —	
♣ —	

Lead a club for trump finesse.

3. The most complex line. East throws a diamond, the hand becomes a progressive squeeze against West. South throws a spade. Trump finesse. Diamond to the board. Second trump finesse. South plays his remaining trumps, throwing clubs from the board. Before the lead of the last trump, this is the position:

♠ K 10	♠ 5	♠ 8 6 4 3
♥ —	♥ —	♥ —
♦ Q 10	♦ A 7	♦ J
♣ J	♣ 8 6	♣ —
♠ A Q J		
♥ 4		
♦ 9		
♣ —		

West must guard spades, high club, and diamonds. On the lead of the last heart, West is squeezed in three suits. If he throws a spade, South wins the last four tricks with ♠ A, ♠ Q, ♠ J, and ♠ A. If West throws a diamond, South throws a club from the board and cashes two diamonds on the lead of the last diamond, and West is squeezed again in clubs and spades.

♠ 5	♠ 8 6
♥ —	♥ —
♦ —	♦ —
♣ 8	♣ —
♠ K 10	
♥ —	
♦ —	
♣ J	
♠ A Q	
♥ —	
♦ —	
♣ —	

West still must discard; if a spade, south wins ♠ A and ♠ Q; if a club, South wins club and ♠ A. If West throws a club, North throws a diamond and wins two club tricks and aces in spades and diamonds. The hand is far more complex than was analyzed in the last issue of *Tech Engineering News*.

As for Mr. Ciaramaglia's hand, this is almost a book example of a double-squeeze.

♠ K J 8 4 3	♠ A 7 6 5	♠ Q 9 2
♥ K J 8 5 4	♥ A 7 6	♥ Q 9 6 2
♦ 7 2	♦ J 9 5	♦ —
♣ 5	♣ A K 10	♣ Q J 9 6 3 2
	♠ 10	
	♥ 10	
	♦ A K Q 10 8 6 4 3	
	♣ 8 7 4	

The play is as follows:

1. Win ♣ A
2. ♠ A
3. Spade ruff with ♦ A.
4. Diamond to the ♦ J.
5. Spade ruff with ♦ K.
6. High diamond (pulling last trump)
7. ♣ K

South now runs his trump. West must hold hearts and the high spade. East must hold hearts and the high club. This is the end position:

♠ K	♠ 7	♠ —
♥ K J	♥ A 7	♥ Q 9
♦ —	♦ —	♦ —
♣ —	♣ —	♣ Q
	♠ —	
	♥ 10	
	♦ Q	
	♣ 8	

On the lead of the last diamond, if West throws a spade, South can just win ♥ A and ♠ 7. Therefore West must throw ♥ J. There is no more need for the ♠ 7, so it is discarded from the dummy. It is now East's turn to be squeezed. If he throws the ♣ Q, South wins the ♣ 8 and ♥ A. So East must throw the ♥ 9. South leads the ♥ 10 and wins the last trick with the ♥ A and ♥ 7. The end position is an example of a simultaneous double squeeze. Thanks for the column and keep up the good work.

I should like to thank John E. Giffels, '14, for his kind words.

Allan J. Gottlieb, '67, is a graduate student in mathematics at Brandeis University. "Puzzle Review" is written for *Technology Review* and *Tech Engineering News*, the M.I.T. undergraduate professional magazine.

KULITE

METALLURGY

Tungsten, molybdenum, cobalt, special alloys — fabrications. "HI-DENS" tungsten alloys — for counterweights and shielding.

SOLID STATE SENSORS

Semiconductor strain gages, integral silicon force sensors and temperature sensors for measurement and control applications.

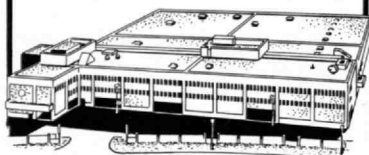
Anthony D. Kurtz, 1951

Ronald A. Kurtz, 1954

KULITE

(Kulite Semiconductor Products, Inc.,
Kulite Tungsten Co., Inc.)
1030 Hoyt Avenue, Ridgely, N. J.

BUILT BY W. J. BARNEY CORP.



Pan American World Airways
Abbott Merkt & Co.,
Engineers & Architects

A Most Efficient Building

This highly automated Pan Am Air Cargo Terminal at John F. Kennedy International Airport is the most advanced of its type, using computerized techniques to speed up cargo handling by 80%.

Constant consultation and coordination with the manufacturer of the specialized equipment enabled our work on this contract to run smoothly and on schedule.

W. J. BARNEY CORPORATION
Founded 1917

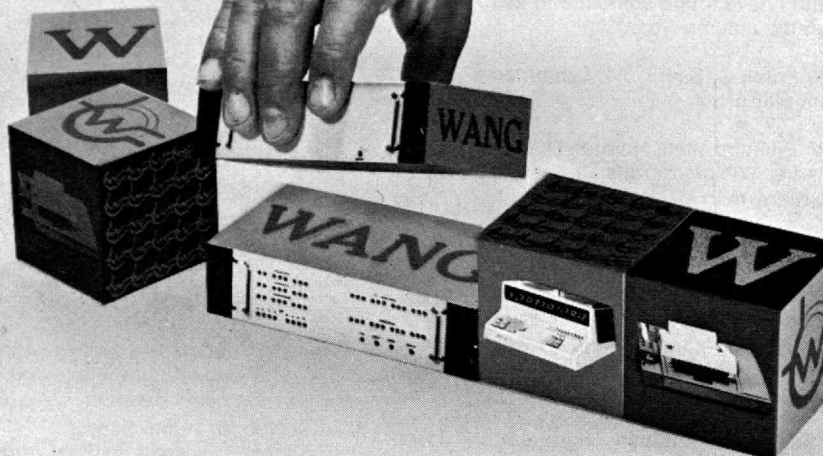
INDUSTRIAL CONSTRUCTION

101 Park Avenue, New York

Alfred T. Glassett, '20, President

Robert F. Lathlaen, '46, Vice President

NUMBER 1
IN NUMBERS



AT LAST... a common-sense, modular approach to on-line digital data handling... THE WANG 4000 SERIES

Here is a simple, low-cost way to handle data acquisition, reduction, logging and computing jobs, without the expense of special engineering and the limitations of a tailor-made, single-purpose system. The Wang 4000 Series consists of modular, black-box elements which may be directly interconnected, by means of a bus line, in any combination to perform a broad variety of data functions. Here is what they offer:

CUSTOM DESIGN AT OFF-THE-SHELF PRICES — Because module design is standardized, Series 4000 systems are substantially lower in cost than special-purpose systems.

OPEN-ENDED EXPANDABILITY — A 4000 system can be expanded up to 32 modules, in any combination, without equipment modification. Alterations in system configuration can be accomplished at any time with plug-in ease.

COMPLETE SYSTEM FLEXIBILITY — A broad variety of 4000 Series input, output, programming, processing and memory units are available. Roles of input, output and control may be reassigned to any module in operation by control instructions through the bus by either operator or program.

SIMPLE, ALGEBRAIC PROGRAMMING — Series 4000 systems are easily programmed with algebraic statements. Operation is simple and straightforward, and no knowledge of special computer languages is required.

A BROAD SELECTION OF MODULAR ELEMENTS

4000 Series modules include on-line digital arithmetic units; key-boards; core storage assemblies; program input sources and accessories. In addition there are a variety of accessory instruments such as scanners; digital voltmeters; A-to-D converters; counters; encoders; digital clocks; output drivers; incremental tape recorders; paper tape and card punches; typewriters; teletypewriters; column and page printers; and other peripheral instrumentation and equipment.

Write today for complete details on the unique 4000 Series.

WANG
LABORATORIES, INC.

DEPARTMENT CF-12, 836 NORTH STREET, TEWKSBURY, MASSACHUSETTS 01876 • TEL. (617) 851-7311

NORCROSS Viscometers

RECEIVERS

Indicating or Recording
Electric or Pneumatic Control
High and Low Alarms
Electric Output for Data Processing



Electrical
Supply

To Measuring
Element

MEASURING ELEMENTS for

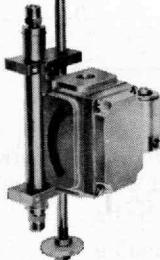
Open
Tanks



Pressure
Vessels



Side
Streams



In Line
Applications



Austin S. Norcross, '29 Frederick J. Elmert, '32 Robert A. Norcross, '51
for full details write Dept. A-69

NORCROSS CORPORATION Newton, Mass. 02158

Representatives in Principal Cities and Foreign Countries

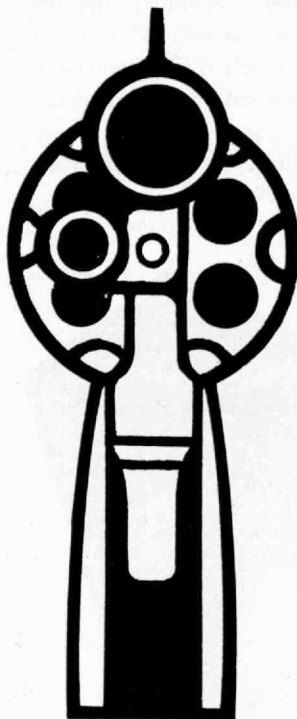
GEARS

**Designed and
Manufactured to Meet
YOUR
Production Requirements**

•
Custom Gears Exclusively
•

DIEFENDORF
GEAR CORPORATION

SYRACUSE, N.Y. 13204



this
is a
recruiting ad
that's

**POINT
BLANK**

who

A highly skilled mechanical engineer with managerial ability.

where

Suburban Philadelphia, Pa.

why

To build boats. (All fiberglass inboard motor cruisers with a new hull design.)

how

By designing optimum production layout, and designing and building production machinery, and training and supervising production personnel.

how much

This job requires an exceptionally skilled and inventive engineer and we'll pay whatever it takes to get him.

If you're willing to take the risks and responsibilities as well as the rewards of this key position, send your resume now to our personnel manager.

CAVA

CAVA INDUSTRIES • ESSINGTON, PA. • 19029

Distilled water has never looked so good!

The new Barnstead "Two-Ten" Laboratory Distilled Water Center distills 2 gals./hour of 800,000-ohm pure water — stores 10 gals. and protects it from contamination, ready for instant use. It's extremely trouble-free and easy to use.

Write for details on this beautiful new answer to distilled water needs.

Barnstead

A Subsidiary of Ritter Pfaudler Corporation

518 Rivermoor Street

Boston, Mass. 02312, U.S.A.



albert

PIPE • VALVES • FITTINGS

**Steel / Wrought Iron / Aluminum
Plastic / Stainless / Alloy**

PIPE FABRICATION From one coded pressure vessel to complete power plant pre-fabricated piping.

SPEED-LAY. Economical pipe system for oil-gathering, dewatering and chemical processing lines.

PIPE PILING & ACCESSORIES

Composite pile extensions. Non-field welding H-Beam points and sleeves.



WRITE FOR FREE BROCHURE:

ALBERT PIPE SUPPLY CO., INC.

Manufacturers—Fabricators—Distributors

101 VARICK AVE., BROOKLYN, N. Y. 11237

Telephone: 212 HYacinth 7-4900

S.G. ALBERT '29 • A.E. ALBERT '56

MAIN

CHAS. T. MAIN, INC.

Engineers

• Studies and Reports • Design
• Construction Management

Industrial Plants • Textile Mills • Pulp and Paper • Graphic Arts • Thermal Power • Hydroelectric Power • Power Transmission • Nuclear Facilities • Industrial Process

441 STUART STREET, BOSTON, MASS. 02116, TEL. (617) 262-3200
1301 E. MOREHEAD ST., CHARLOTTE, N.C. 28204, TEL. (704) 375-1735

Public relations representation in New York on a dignified, professional and practical basis. Brochure available.

James H. Kennedy '50, President

PR NY

PR-NEW YORK, INC.
342 MADISON AVE., N.Y. 10017
(212) 867-4550

YOU'RE "AT HOME" WITH HAMILTON HOUSE

★ Attractively appointed rooms with kitchenettes ★ Royal Colonial Restaurant ★ Rooftop Kismet Lounge ★ Skyline Health Club ★ Function Facilities for 10 to 200 persons

For reservations phone 734-7400

HAMILTON HOUSE MOTEL

1110 Commonwealth Ave., Boston
(3 blocks from B. U. Bridge)

USE CHRISTMAS SEALS



FIGHT TUBERCULOSIS

EMPHYSEMA

AIR POLLUTION

Aerofin Corporation	67
Albert Pipe Supply Company	66
The Anaconda Company	13
W. J. Barney Corporation	64
Barnstead Still & Sterilizer	66
Boit, Dalton & Church Inc.	67
Boston Manufacturers Mutual Insurance Co.	
/Mutual Boiler and Machinery Insurance Co.	45
Brewer Engineering Laboratories, Inc.	44
Capitol Engineering Corporation	44
Cava Industries	65
Cleverdon, Varney and Pike	44
Charles Nelson Debes Associates, Inc.	44
Dieffendorf Gear Corporation	65
Paul E. Dutelle & Company, Inc.	43
Eadie, Freund & Campbell	44
Eastman Kodak Company	2
Fabric Research Laboratories, Inc.	44
Fay, Spofford & Thorndike, Inc.	44
First National Bank of Boston/	
Old Colony Trust	1
General Motors Corporation	Cover II
General Radio Company	Cover IV
Hamilton House Motel	66
Jackson & Moreland	44
Kulite Tungsten Company	64
The Kuljian Corporation	44
Alexander Kusko, Inc.	43
Lockwood Greene Engineers, Inc.	43
Loomis and Loomis	44
Chas. T. Main, Inc.	66
Edward R. Marden Corporation	43
Massa Division of Dynamics Corp. of America	3
Massachusetts Mutual Life Insurance Co.	12
Metcalf & Eddy Engineers	44
M.I.T. Alumni Fund	68
Mueser, Rutledge, Wentworth & Johnston	44
Norcross Corporation	65
PR-New York, Inc.	66
Maurice A. Reidy Engineers	44
Soil Testing Services, Inc.	44
Swindell-Dressler Co., Division of	
Pullman, Inc.	43
Syska & Hennessy, Inc.	43
The Tech Coop	Cover III
Wang Laboratories, Inc.	64



Boit, Dalton & Church

Incorporated
INSURANCE SINCE 1865

89 BROAD STREET, BOSTON, MASS. 02110
Telephone 617/482-3100



All the way from Tight Specs to
Tight Budget to Operating Guarantee

AEROFIN *Smooth-Fin*
HEAT EXCHANGERS
Are the **BIG** Choice

Aerofin, the industry pacesetter, offers the widest possible range of *fan-system-engineered* hot and chilled water, steam, direct expansion, booster, SMOOTH-FIN coils. So why specify *over* or *under* your exact requirements?

Aerofin's close-fin spacing produces optimum heat-exchange capacity in unusually *compact* space. SMOOTH-FIN design coils have a low airside friction factor — yet are completely compatible with modern high-duct velocities. Need coil application help? Your Aerofin man has the answer.

AEROFIN CORPORATION

Lynchburg, Virginia 24505

Aerofin is sold only by manufacturers of fan system apparatus.
List on request.

AEROFIN OFFICES: Atlanta • Boston • Chicago • Cleveland • Dallas • New York • Philadelphia • San Francisco

To the MIT Alumni Fund

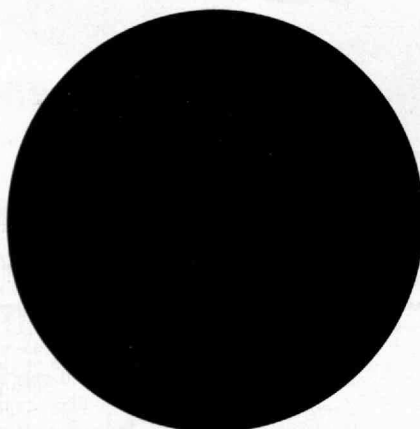
Massachusetts Institute of Technology
Room E19-439
Cambridge, Massachusetts 02139

- ☐ I enclose \$..... as a gift to MIT through the Alumni Fund.
☐ I would like this gift recorded in memory of

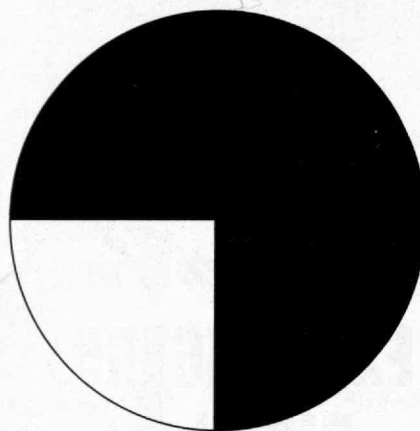
Name

Address

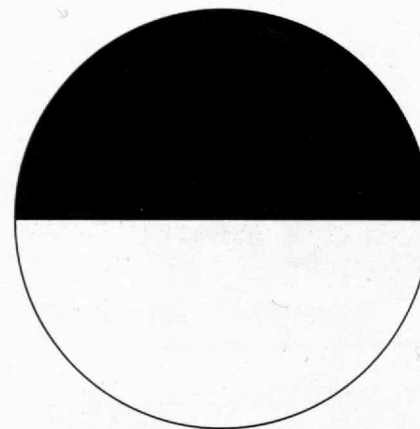
Please make checks payable to the Massachusetts Institute of Technology.
Securities may be sent through the Treasurer of the Institute, same address.
All gifts are tax deductible in accord with Federal law.



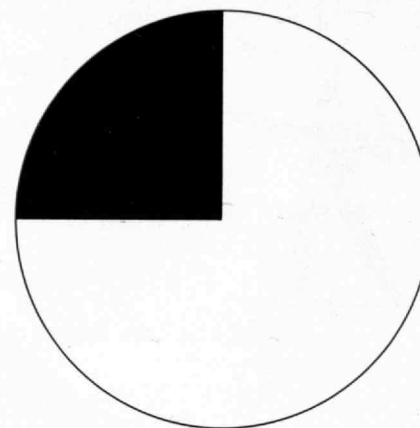
Although the principal participants in the Fund are alumni, the support of many others is gratefully appreciated. Gifts memorializing a loved one or a friend, gifts from parents, and gifts from those who wish to further the objectives of M.I.T. are welcome.



The current objective of the Fund is to advance the quality - and quantity - of student housing: Institute Houses, fraternities, Graduate School. Unrestricted gifts - and those so designated - will be used for this purpose.



In 1966-67, 17,545 donors gave \$2,536,039. The goals for 1967-68 are 20,000 donors and \$2,700,000.



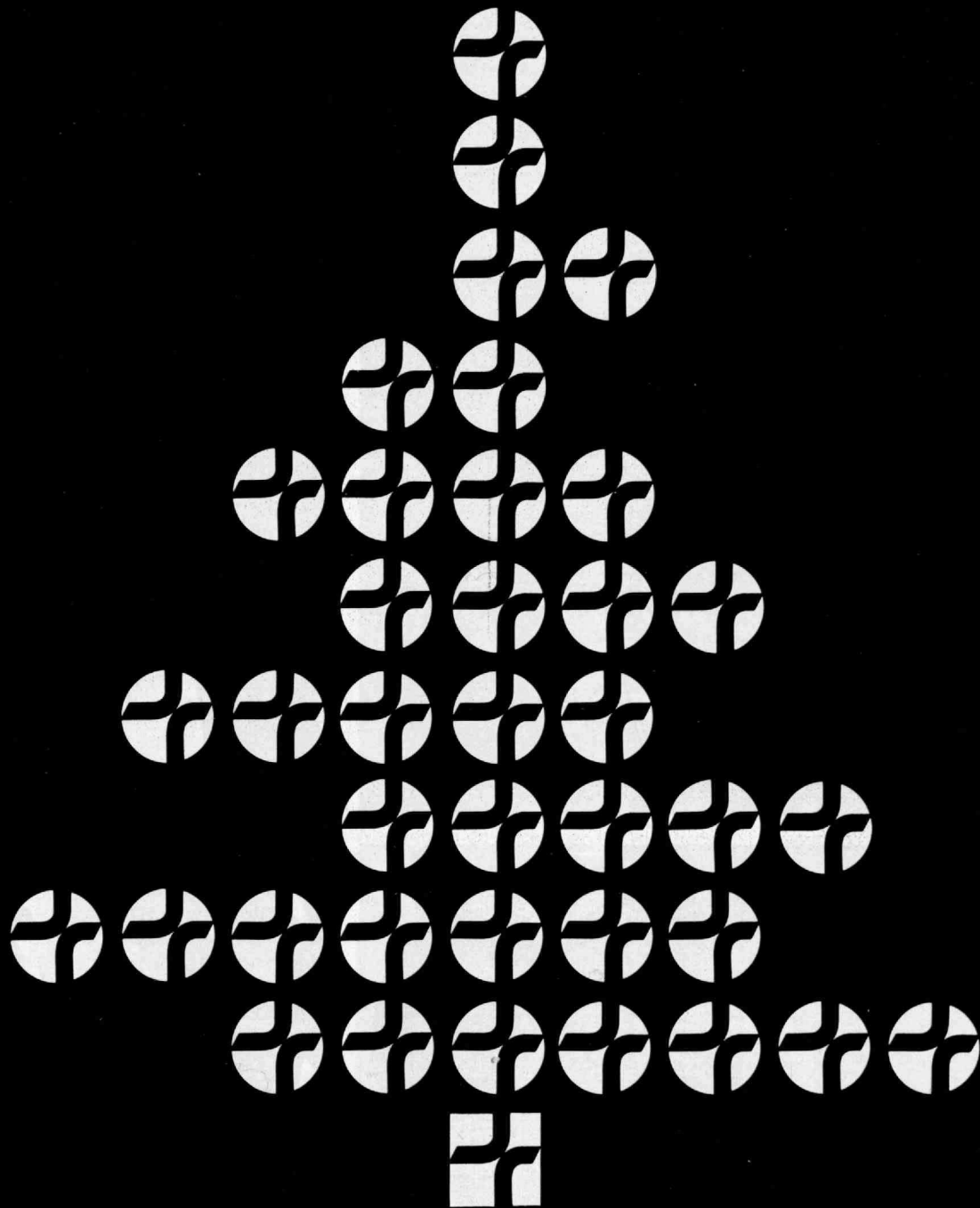
The M.I.T. Alumni Fund seeks to enhance the student environment - housing, extra-curricular, scholarships - that it may be consistent with the high quality of M.I.T.'s academic instruction and facilities. Receipts are used for capital purposes; none is applied to the operating budget of the Institute.

Toward a complete educational experience

Alumni Review

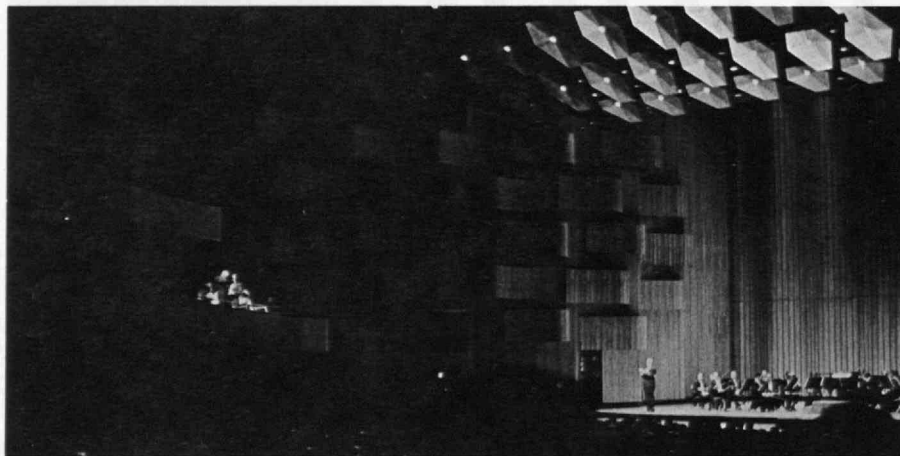
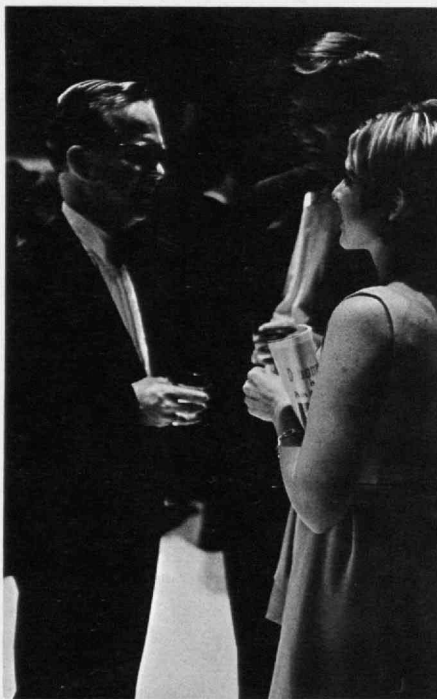
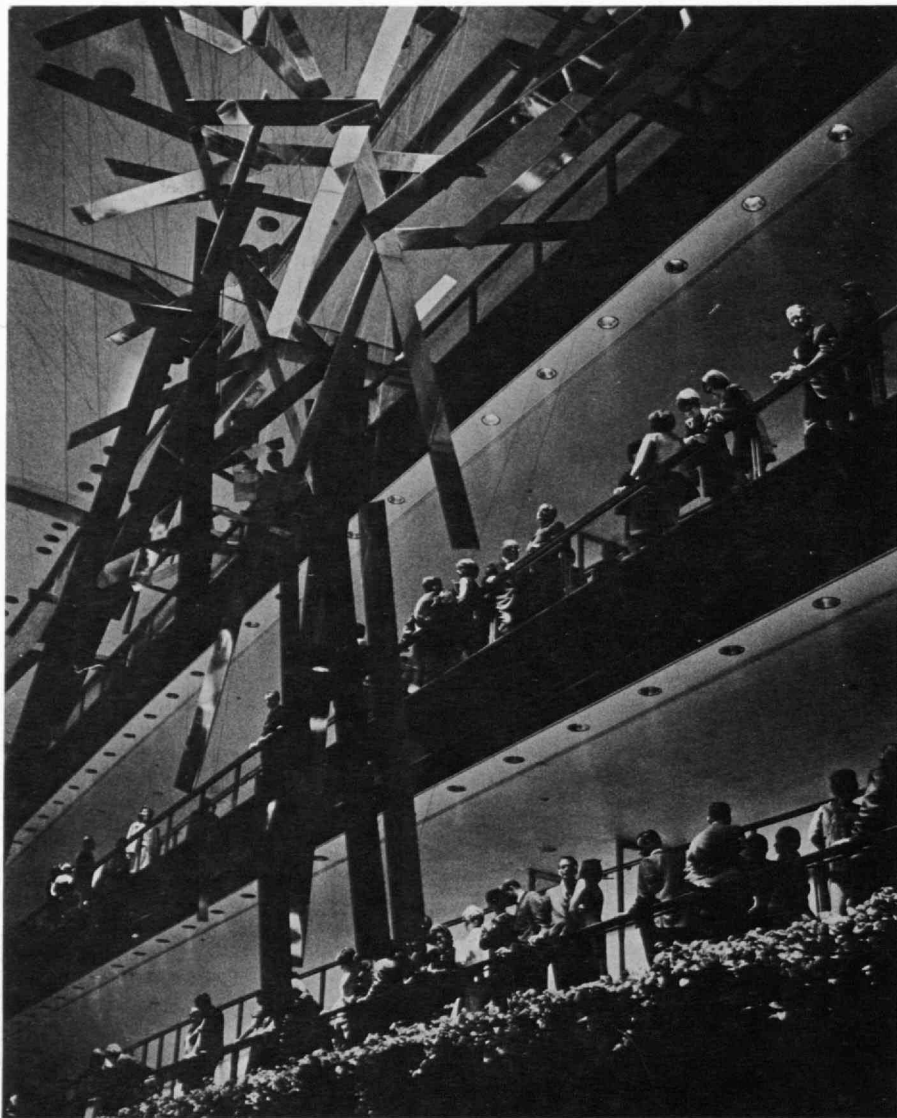
Review

Alumni Council



Philharmonic Hall of Lincoln Center was the spectacular setting for the opening event of the M.I.T. Alumni Center of New York 1967-68 season—a reception in honor of Dr. and Mrs. James R. Killian Jr. ('26) and concert by the Festival Orchestra of New York. Dr. Killian, seated with Mrs. Killian in a Philharmonic Hall box (above), received the Association's Bronze Beaver Award at the end of the concert intermission; later he posed with the symbol of the award (top right) with M.I.T. President Howard W. Johnson (left), Theodore A. Mangelsdorf, '26, Past President of the Alumni Association, and Julius A. Stratton, '23, President Emeritus of M.I.T. (Photos: Owen D. Franken, '68)

Alumni Review



Alumni Review

Alumni Council: The Fruits of Long Range Planning

Members of the Alumni Association's Long Range Planning Committee held the stage at the year's first Alumni Council meeting on October 30, to describe their major effort to foreset goals and methods for the many Alumni Association activities and to report progress toward the goals.

The theme of the effort, said John A. Lunn, '17, Chairman of the Central Committee, is to strengthen the two-way relationship between M.I.T. and its graduates.

D. Reid Weedon, Jr., '41, emphasized the changing character of M.I.T. and of its student and alumni bodies. Students represent a broader range of interests, he said, and alumni have wider professional commitments. By 1975, said Mr. Weedon, most M.I.T. alumni will hold graduate degrees, and will hold only graduate degrees, so there will be growing competition from other institutions for the time and commitment of Institute graduates.

The Long Range Planning Committee and its many sub-committees unanimously emphasized four characteristics of the Institute's alumni relationships for constructive future action: Many alumni feel that their only communication with M.I.T. is in connection with efforts of the Alumni Fund; there is little opportunity for communication from alumni to the Institute; *Technology Review* needs major changes to make it representative of M.I.T. and alumni interests; and "continuing education" should be a major commitment.

John A. Lunn, '17, emphasized that the final report of the Long Range Planning Committee made substantive recommendations on all four of these areas. He discussed in detail the Committee's proposal to relieve the Alumni Council of its role as the principal governing body of the Alumni Association—an assignment to be taken over by a Board of Directors which would succeed the present Executive Committee. Membership on the Alumni Council could then be broadened so that the Council could become a "first circle of communications" for all those active in Alumni Association affairs.

Howard L. Richardson, '31, and Theodore T. Miller, '22, joined to discuss various aspects of the Alumni Fund. Mr. Richardson, who is Chairman of the 1968 Fund Board,

reported substantial progress toward the 1968 Fund goals of \$2.7 million from 20,000 alumni. The Long Range Planning Committee set a 1975 Alumni Fund goal of \$5 million from 27,000 donors, which Mr. Miller called "an attainable median figure based on the best studies we could make of the national economy, the income of the alumni body, and the amount of interest which we could expect to stimulate among alumni."

M.I.T. Alumni Center of New York: Honors for Dr. and Mrs. Killian

Nearly 2600 alumni—a full house at Philharmonic Hall of Lincoln Center—paid tribute to Dr. and Mrs. James R. Killian, Jr. ('26) at a reception and concert by the Festival Orchestra of New York on October 13.

Dr. Killian received the Alumni Association's Bronze Beaver Award. "He has led M.I.T. into dynamic relationship with contemporary society," said the award citation, "and has given alumni a new focus for the meaning of the Institute."

Thomas Dunn led the Festival Orchestra in works by Haydn, Bartok, and Piston, the latter with Noel Lee as piano soloist.

Washington: Urban Problems in Modern Life

Robert C. Wood, Under Secretary of the Department of Housing and Urban Development and former head of the M.I.T. Department of Political Science; David Ginsberg, Executive Director of the President's Commission on Civil Disorders; and Wiley Branton, Executive Director of the United Planning Organization, will be among panelists at the first 1967-68 seminar of the M.I.T. Club of Washington on December 16. The day's topic will be Urban Problems in Modern Life, and further information and regis-

tration forms are available from John J. Phillips, Jr., '38, President of the M.I.T. Club of Washington, 600 Independence Avenue, S.W., Washington.

Washington: Alaska—to Reap or to Despoil?

Technology holds the key to Alaska's future, and Alaska is the fulcrum on which balances America's future wealth. "Alaska's development depends not on the wagon-train pioneer but on the scientist, engineer and banker," Howard W. Pollock, S.M.'60, who represents Alaska in the U.S. House of Representatives, told over 275 members and guests of the M.I.T. Club of Washington at the Club's first Congressional Dinner this fall. "Alaska's is a brand new kind of pioneering that emphasizes modern technology rather than a strong back," said Congressman Pollock. "It is our last frontier, our greatest technological challenge, and our last chance to exploit vast resources while preserving natural values."

Congressman Pollock spoke of two of Alaska's great resources. Nowhere in the nation, he said, is the wealth of the oceans as great as off the Alaskan coasts. Full development of Alaskan fisheries could yield over 500,000 tons of fish a year, adequate animal protein to meet the needs of 20 million people. "Technology that develops new products and new methods of utilizing old products is the key to unlocking this resource."

Recent discovery of a vast deposit of iron ore on the Alaskan peninsula, said Congressman Pollock, also emphasizes the crucial role of technology in building Alaska's future. The ore is close to deep-water transportation and to fuel reserves which could be used in its processing. But the deposits contain an undesirable amount of titanium oxide, and removal of this unwanted element is a major technological challenge.



Certificates of appreciation have been awarded to 99 alumni for outstanding services to the 1967 Alumni Fund. Those present at the October

Alumni Council meeting were seated together to receive the plaudits of their colleagues.



Congressman Pollock gave other examples of rich mineral and timber resources which cannot economically be developed with today's technology. And the question, he said, is whether we can and will solve these problems. "Can we build great cities without polluting the air and water? Can we conquer the land without destroying the animals that inhabit it? Can we build without destroying ourselves? This is "the essence of the challenge of Alaska today," declared Congressman Pollock. We must do these things, he said, because Alaska is our last frontier. "If Alaska goes, there is no place else. Our last chance will have faded."

Congressman Pollock's audience included representatives of the Harvard, University of California, and University of Minnesota alumni organizations in the District of Columbia who were invited as special guests by John J. Phillips, '38, President of the M.I.T. Club of Washington. The meetings, the first of a series planned by the club, was at the Old House Office Building dining room.—William G. Osmun, '40, Publicity Chairman

Boston Stein Club: The Truth About Sheriffs

The sheriffs with whom small children are familiar wear spurs, ride horses and play their parts in law enforcement on the unpaved streets of western frontier towns of the last portion of the Nineteenth Century. This image is shown to them and to us on the surfaces of motion picture and television screens. Sheriff Hedges has seen the look of disappointment spread over the faces of many youngsters introduced to him when they found him not to conform to their image of a sheriff.

On Wednesday evening, October 11, members of the Boston Stein Club, many for the first time, learned what a Massachusetts sheriff's job really is. They learned it from Sheriff Charles W. Hedges who spoke on the "Powers, Duties and Responsibilities of a Massachusetts Sheriff" at the first meeting of the Boston Stein Club for 1967-1968.

Sheriff Hedges outlined the responsibilities which his office bears: to be certain that personnel required for the legal operation of courts within his jurisdiction are present (this includes tending jurors during their terms of duty), to serve writs, and to be master of the prisons at Walpole and Norfolk. Each of these assignments involves considerable responsibility. The sheriff comes in contact with people who are under conditions of great stress. Doing his job is far removed from being a coldly routine matter.

The Released Time Program, in operation in the prisons of Norfolk County since 1961, was discussed in detail. A prisoner acceptable for this program goes out of prison in the morning,



Howard W. Pollock, S.M.'60 (above, right), U.S. Representative from Alaska, was the speaker this fall as the M.I.T. Club of Washington inaugurated its Congressional Dinners in the House Office Building dining room. John J. Phillips, Jr., '38 (top), presided as President of the Club, and Louis B. C. Fong, '35, the club's Vice President for Social Affairs and Mrs. Phillips (above, left) were among the head table guests. (Photos: William G. Osmun, '40)



works a full day outside, and returns to prison at night. An employer cooperates with authorities in supervising these persons closely. More than 60 per cent of Released Time prisoners have been hired on release from prison by their employers. Payment for services rendered is made to the Sheriff's Office, and kept for the prisoner until his sentence has been completed. Sheriff Hedges feels that this program has already proven itself workable.—Melvin H. Saxe, '48, Secretary

Boston: Changes in Scientific Knowledge

"Spectacular" changes in basic science today are typified by dramatic qualitative revisions of our understanding in three fields—the nature of matter, the nature of the cosmos, and the nature of life. These developments and M.I.T.'s roles in them were described to members of the M.I.T. Club of Boston by Robert A. Albery, Dean of the M.I.T. School of Science, at luncheon on October 19.

Modern high-energy physics has largely altered the theories of atomic and nuclear structure which were widely accepted as little as 15 years ago, Dean Albery said. Instead of a few relatively simple elementary particles, physicists today envision a large number of particles which are so complex that no one is sure what they are. And, said Dean Albery, as particle accelerators increase in power, we can safely predict that still more particles, now postulated theoretically, will in fact be identified.

Modern astronomy now centers on studies of invisible radiation reaching the earth from space, and this new dimension promises to add broad new understanding of our universe. Already we know that 10 to 100 times as much x-ray radiation as visible light reaches the earth's atmosphere; some of it comes from identifiable sources, but some sources appear where they should not and others that seem logical emitters do not do so. Very short wave emissions from space, also being detected now for the first time, have added an important confirmation of the "big bang" theory for the formation of the universe.



Nearly 100 Boston-area alumni gathered at the Union Oyster House in Boston on October 19 to hear Robert A. Albery, Dean of the M.I.T. School of Science, describe recent revolutionary changes in basic science and the Institute's role in achieving and exploring them.

Modern biology, Dean Albery said, rests on the discovery of the role of DNA in storing and transmitting genetic information. Now we are beginning to understand how this control is achieved through the depressing and stimulating effects of certain chemicals on cellular processes. And we have discovered that organization of the cell is highly intricate; but we also find, Dean Albery said, that it is systematic and understandable.

Western Maine: The Human Technology of the Future

Technology, through which man is now confronted with massive problems far beyond his experience and expectations, still holds within its power their solution. But the new technology must have within its scope not only science and engineering but indeed all the activities and concerns of man, Howard W. Johnson, President of M.I.T., told more than 60 members and guests of the M.I.T. Club of Western Maine in Portland on October 19.

The major problems in the world today, Mr. Johnson said, are urban management, transportation, population control, air pollution, conservation, arms reduction and control, the world food shortage, the exploration of extraterrestrial opportunities, the great gulf between the haves and the have-nots. All of these, he said, are human problems which require a technological and management approach that combines engineering, the social sciences, and—most of all—a philosophy for understanding our goals.

"And tomorrow's challenges are so huge," he added, "that the men capable of dealing with them will need to be technological generalists rather than technical specialists."

The dinner was attended by alumni and wives from our own area and by several from eastern New Hampshire. We were fortunate in having with us Donald P. Severance, '38, Executive Vice President of the Alumni Association; Robert W. Forster, '35, our club's representative on the Alumni Council; and Paul E. Weamer, '49, Past President of the M.I.T. Club of Boston. Our guests also included the parents of several Maine students now attending M.I.T.

In discussing recent student "demonstrations" in other parts of the country, President Johnson expressed much confidence in the serious attitude of M.I.T. students, despite the pressures to which the younger generation is now exposed.—John B. Babcock, '10, Secretary, 33 Richardson Street, Portland, Maine 04103

Rochester: Baseball Game and Business

The M.I.T. Club of Rochester held its annual meeting Saturday, September 23, at the West Cabin, Mendon Ponds Park. There were 38 members in

attendance who enjoyed a steak dinner and the traditional baseball game, won this year by a team representing the even-numbered classes.

After the meeting was called to order by President Bill Pitbladdo, '31, last year's Club and Alumni Fund activities were reviewed. Awards were presented to Ralph Peters, '30, for his work as head of the Special Gifts Committee and to Bill Pitbladdo as Chairman of the 1965-66 Fund Drive.

Two members were selected for future service to M.I.T. Clarence Wynd, S.M. '27, was elected by the Executive Committee to membership on the new Alumni Club Advisory Board. And Harry Essley, '36, was selected by the Executive Committee of the Alumni Council to serve as Deputy Chairman of the September Alumni Officers' Conference in San Francisco.

The following officers for 1967-68 were unanimously elected: President, John D. O'Brien, '51; President-Elect, Andrew C. Price, 3rd, '50; Vice President, Robert G. Bowie, '38; Treasurer, Reynold A. Grammer, Jr., '47; Secretary, William O'Neill, '43; Assistant Secretary, Terrence Riley, '65. Serving on the Executive Committee are: James S. Bruce, '39; Wells Coleman, '37; Donald Ramsey '50.—W. Blake Foster, '60, Secretary, 26 Potter Place, Fairport 14450

Southern California: This Year's America's Cup

About 200 alumni and their wives attended the meeting on October 12 (Columbus Day, appropriately) at the Del Rey Yacht Club to hear Professor Halsey Herreshoff speak about the recent America's Cup race. He showed some remarkable slides taken during the races and gave a stimulating talk about the race this year and the history of the races over the last century. He also discussed some of the research currently being done on sailing yacht design at the Institute. It was a delightful evening in a beautiful setting.

The annual meeting of the M.I.T. Club of Southern California will be on Tuesday evening, January 17, 1968, with an outstanding speaker. At that time the new officers will be installed.—Toni Schuman, '58, Assistant Secretary

San Diego: The Largest in History

Halsey C. Herreshoff, S.M.'60, drew the largest audience in the history of the M.I.T. Club of San Diego when he spoke there this fall on the America's Cup challenge of 1967. More than 100 local alumni, wives, and guests were on hand, and the question period alone lasted an hour after Mr. Herreshoff's illustrated presentation of "Why They Won."—Andrew F. Hillhouse, Jr., '43, Secretary-Treasurer, 1252 Fleetridge Drive, San Diego, Calif. 92106

M.I.T. Florida Festival: Ocean Engineering and Cape Kennedy

At least 200 alumni are expected for a mid-winter "Florida Festival" at Quality Court Garden Motel in Orlando on Saturday, January 27, and many will stay over for special tours of Cape Kennedy to be conducted by N.A.S.A. officials on January 28.

James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, will lead an official delegation from Cambridge, and he will be principal speaker at the Florida Festival banquet on Saturday evening. Earlier in the afternoon there will be a report on current affairs at M.I.T. by Kenneth R. Wadleigh, '43, Dean of Student Affairs; a description of ocean engineering as a new approach to making the vast resources of the oceans useful to man by Alfred A. H. Keil, Head of the Department of Naval Architecture and Marine Engineering; a concert by the Logarithms, an M.I.T. student musical group; special films of N.A.S.A. activities at Cape Kennedy; and a pool-side cocktail party.

M.I.T. groups throughout Florida are arranging special bus transportation to Orlando, and the sponsors expect many northerners fleeing from winter to join the festivities. Peter C. Hand, '48, General Chairman of the Committee, says this will be "a really big one that shakes the cabbage palms." For further information and registration forms, write Lorin M. Hailey, Jr., '50, Box 2242, Orlando, Fla. 32800

Club Calendar

Columbus—clam-bake dinner at the Berwick Party House on December 1

Minneapolis—dinner meeting at Eddie Webster's Restaurant on December 4: Robert A. Alberty, Dean of the M.I.T. School of Science on "A Creative School of Science."

Montreal—dinner meeting December 4 at the University Club: Halsey C. Herreshoff on "The World Series of Yachting."

Chicago—dinner meeting on December 5 at the Union League Club: Robert A. Alberty, Dean of the M.I.T. School of Science on "A Creative School of Science."

Detroit—dinner meeting on December 7 and talk on the Ford Racing Program: Roy Lunn, Manager of Advanced Concepts in the Special Vehicles Office and one of the principal designers of the Ford Le Mans cars.

Long Island—dinner meeting December 15 at the Roslyn Country Club: Harold E. Edgerton, '27, M.I.T. Professor of Electrical Engineering.

Washington, D. C.—seminar on December 16 at the Institute for Defense Analyses on "Urban Developments": Robert C. Wood, Under Secretary of Housing and

Urban Development; David Ginsburg, Executive Director of the President's Commission on Civil Disorders; and Wiley Branton, Executive Director of the United Planning Organization.

Rochester, N.Y.—luncheon meeting in the small hall, Chamber of Commerce Building, on December 26: Avery A. Ashdown, Ph.D.'24, Associate Professor of Organic Chemistry, Emeritus, with undergraduates, on the state of M.I.T. today.

Atlanta—luncheon on December 27 at Fan & Bills Restaurant.

Columbus—luncheon on December 27 at Battelle Memorial Institute.

Milwaukee—luncheon on December 27 at the University Club.

Bethlehem—luncheon and tour at Homer Research Laboratories on December 28.

Baltimore—luncheon on December 28 at Engineering Society of Baltimore.

Los Angeles—dinner on December 28 at Biltmore's Galeria Room.

Puerto Rico—dinner meeting on December 28 in San Juan: Howard W. Johnson, President of M.I.T., guest of honor.

Washington, D.C.—Christmas holidays meeting for alumni and undergraduates at the Cosmos Club on December 28.

Worcester, Mass.—dinner meeting and tour of Wymer-Gordon Company on December 28: Thomas W. Harrington, Jr., M.I.T. Director of Placement, on "Career Counseling."

Boston—luncheon meeting on January 11 at the Union Oyster House, Irwin W. Sizer, Dean of the M.I.T. Graduate School.

Los Angeles—dinner meeting on January 18 at the Statler-Hilton: Jerome B. Wiesner, Provost of M.I.T. and Professor of Electrical Engineering.

Central Florida—"Alumni Florida Festival" on January 27 in Orlando: James R. Killian, Jr., '26, Kenneth R. Wadleigh, '43, M.I.T. Dean of Student Affairs, the Logarithms, and others.

Northern New Jersey—dinner meeting and tour of Bell Telephone Laboratories, Inc., Holmdel, N.J., on January 30.

Boston—luncheon meeting on February 8 at the Union Oyster House: William W. Seifert, Sc.D.'47, Assistant Dean of the M.I.T. School of Engineering.

Washington, D.C.—afternoon seminar on February 17 at the Institute for Defense Analyses: ocean engineering.

Chicago—dinner and theater party on February 23.

Philadelphia—day-long Regional Conference on March 9 at the Sheraton Hotel:

Former President Dwight D. Eisenhower, Howard W. Johnson, James R. Killian, Jr., '26, Irwin W. Sizer, and William S. von Arx, Sc.D.'55, M.I.T. Professor of Physical Oceanography.

Boston—luncheon meeting at the Union Oyster House March 14: John Bush, Vice President of Millipore Corporation.

Mexico—Fiesta of the M.I.T. Club of Mexico on March 14-16 in Mexico City.

Northern New Jersey—concert by the M.I.T. Symphony Orchestra on March 25.

Chicago—concert by the M.I.T. Symphony Orchestra on March 27.

Dallas—Regional Conference on March 30.

Cambridge—class reunions on June 7-9 and Alumni Day on June 10.

Deceased

Joseph H. Kimball, '94, September 16
J. Walter Allen, '99, March 8*
Harold W. Beder, '99, August 24*
Benjamin E. McKechnie, '02, August 25
Richard M. Lawton, '03, August 16*
Ralph O. Ingram, '04, September 13
Percy Goodale, '05
Myron E. Helpert, '05, August 25
Willard E. Simpson, '05, June 6
Winfred A. Taylor, '05, March 14
Frank E. Hamilton, '07, December 28*
William B. Hunter, '08, June 19
Samuel Cabot, '09, September 8
Derick S. Hartshorn, '09, September 15
Lester C. Greenwood, '10
Henry J. Perry, '10, December 12, 1966
Clifford E. Snyder, '10, February 10
Laurence Watts, '11, October 5
E. Gordon Taylor, '13, September 11
Gerald H. Beard, '14, August 17
Newell L. Foster, '15, October 2*
Norman Vile, '16, August 31
Walter Engelbrecht, '18, August 27*
Alfred R. Evans, '18, September 24*
William Weber, '18, August 29
George Hanson, '20, July 2
Ernest Henderson, '21, September 6
Joseph J. MacDonald, '21, June 24
Aubrey J. Northrop, '21, May 29
Clark B. Carpenter, '22, April 28
G. Everett Farmer, '22, October 4
Walter T. Rolfe, '23, June 10
Elbert C. Brown, '24, September 4
Louisa E. Norton, '24, October 11, 1966
David J. Sullivan, '24, July 31
Edward N. Wendell, '25, September 24*
Charles A. Bianchi, '26, June 22
George D. Cummings, '26, July 27
Sydney D. Berman, '27, February 14
Paul B. Gebhardt, '27, May 1966*
Roger A. MacArthur, '27, August 29
John W. Courter, '29, September 23
William C. Bowlen, Jr., '30, 1966
Joseph R. Miller '30, September 11
Robert D. Knight, '31, August 19
Charles M. Parker, '34, September 20
John B. Skinner, '34, September 8
Slioma B. Vindsberg, '41, September 12
Edward Washken, '46, August 12
Anthony P. Winfisky, '51, September*
Carl J. Wiederanders, '56, August 11
Alan Hollander, '61, October 7
*Further information in Class Review.

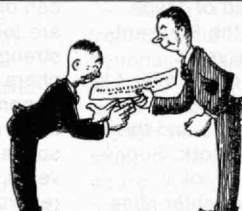
Kane on M.I.T.



The long-awaited 1967 Alumni Register appeared in mid-October. It lists all alumni, both living and dead, and various groups, both Institute and alumni. But some groups are not readily apparent. It requires a bit of research to dig them out.



53,495 living alumni are listed, with addresses, all the way from Aaker, D.A. 60 to (404 pages later), Zymelman, M. '96



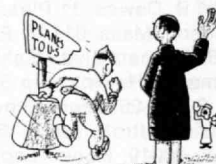
Shortest names: Lots of Ip, Ko, Ku, Li, Lo, Lu, etc. in Hong Kong & Taiwan. Longest? Nimmanahaeminda, A. '47 and Velissaropoulos, P.D. '62



Among foreign groups, there are three times as many alumni in Luxembourg as in the USSR;



only half as many in Egypt as in Israel....



and 17 in South Viet Nam - about 50 % of them transients



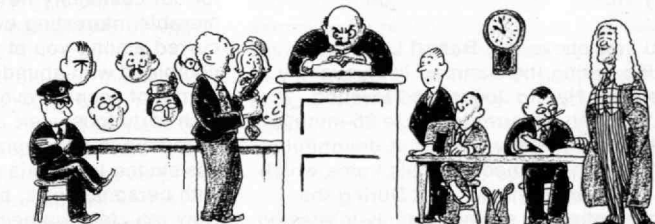
We are an intercollegiate body. You will find such names as BRANDEIS, BROWN, CORNELL, RADCLIFFE, SMITH, TUFTS, WILLIAMS, and VASSAR (Wellesley is notably absent)



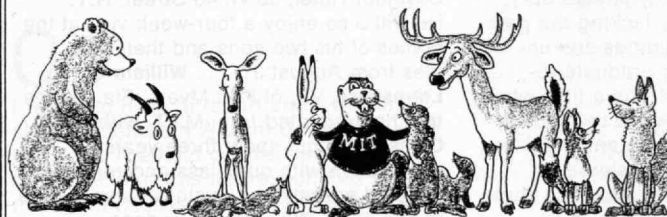
We can fill the ivy-covered HALLS with DEANS, PROVOSTS, PROCTORS, STAFFS, and a couple of SENIORS. Since the names of 1965-66 students are listed, there's a student body



We could also fill a COURT with NOBLES - KING, PRINCE, EARL, LORD, DUKE, KNIGHT, MARQUIS, BARON.... and all their PAGES, SQUIRES, and a few JESTERS



And of course there are other COURTS, those that dispense JUSTICE with JUDGE, JURY, LAWYER, SHERIFF, NOTARIES, ...and from both COURTS, the Hon. Justice Sir Arthur Tyndall '24

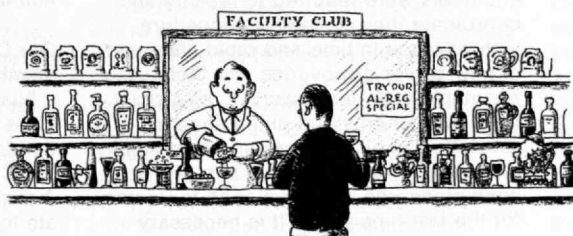


A zoo could be stocked with BEAR, BEAVER (naturally), DOE, FISHER, FOX, GOAT (MOUNTAIN), HARE, MARTENS, MINK, MOLES, STAGG, and WOLF



...and an aquarium with assorted FISH: BASS, HADDOCK, HERRING, PERCH, PIKE, POLLACK, RAY, SALMON, SOLE, TROUT, WHITING, ~ and a few SEALS (with TRAINER)

In the pages of the Register are other kinds of STOCK enough for several ROUSES in the MAY-time, or a good BENDER,



....such as BEER, GINN*, PORT, SHERRY, STOUT, CHAMPAGNE, WINE, MEAD ~ or, for a mixed drink, a MARTINI ora GIBSON

*120 proof

H.B. KANE

Class Review

98

Here is the list of the "very much alive" members which I promised you in the previous issue of *Technology Review*: Joseph W. Ames, 7 Gooch Street, Melrose, Mass. 02176; Alvan L. Davis, 25 Concord St., Waterbury, Conn. 06710; Fred B. Dawes, 11 Pleasant Street, Hudson, Mass. 01749; Edward T. Foulkes, 1768 Leimert Blvd., Oakland, Calif. 94602; Lyman F. Hewins, c/o Spencer H. Hewins, Rt. 2 Box 26, Leonardtown, Md. 20650; Edwin Kuttroff, 128 W. 59th St., New York, N. Y. 10019; Robert Lacy, 201 Tunbridge Rd., Baltimore, Md. 21212 (Summer-Squirrel Island, Maine 04570); Mrs. John H. Lambert, 70 Wannalancit, Lowell, Mass. 01854; Willard B. Nelson, 621 DeMott Ave., Baldwin, N. Y. 11512; George K. Newbury, 525 4th Ave. W., Hendersonville, N.C.; Walter Page, 410 Loves Lane, Wynnewood, Pa. 27536; James Purdon, 308 Commonwealth Ave., Boston, Mass. 02115; Professor Joseph C. Riley, 518 Great Plain Ave., Needham, Mass. 02192; Albion W. Shaw, 73 Webcowet Rd., Arlington, Mass. 02174. . . . **Arthur L. Goodrich**, M.I.T. Emeritus Associate Professor, died July 10.

You saw above that **Robert Lacy** is in Maine during the summer. In August my husband, Harold Jones, and I visited Mr. Lacy on Squirrel Island, a 25-minute sail from Boothbay Harbor. A delightful host, he entertained us in his home which he keeps with one servant. During the conversation he seemed keenly interested in conservative politics, the control of the Panama Canal by the U.S., and in flying saucers. He also took us on a brisk walk with his dog, Jim, around the beautiful Island. We had a difficult time keeping up with them! He did not mention where his three children live, but he did say that Louise graduated from Smith College, Richard from the U.S. Coast Guard Academy and Robert G. from Bowdoin College. . . . Will you members please write to me about your special interests? Perhaps you can tell me the whereabouts of your children, grandchildren and great grandchildren. As you know, the future of 1898 news under Class Review will depend upon your letters to your Acting Secretary.—**Mrs. Audrey Jones Jones**, 232 Fountain Street, Springfield, Mass. 01108

99

Harold W. Beder, IV, a native of Philadel-

phia, was born July 23, 1876, and died at his home in Pleasantville, N.Y. August 24, 1967. He designed many important buildings including the Rutgaers Church, Mercantile Library, and received the Fifth Avenue Medal for the U.S. Mortgage Bank. Harold was a member of the Pleasantville Board of Trade for nine years, Chairman of the Pleasantville Planning Board for four years, Trustee of the Presbyterian Church for 11 years. His memberships included the American Institute of Architects and the Architectural League of New York. Surviving him are his sons Harold W. of Cleveland and Robert, his daughter Miss Elizabeth Beder of Pleasantville, and three grandchildren. . . . **J. Walter Allen**, VI, was born August 19, 1875, and died March 8, 1967. He was an electrical engineer for the Boston Elevated Railway. His son is Ralph L. Allen of Caldwell, N. J. . . . **Charles D. Drew**, I, was born September 18, 1875, and died March 22, 1967.—**Percy W. Witherell**, Secretary, 1162 West St., Wrentham, Mass. 02093

03

Well, classmates, the summer interval for our customary news is over and innumerable interesting events have occurred among you at your distant terrain, combined with abundant relaxation and no doubt scenic travels. However, your fortuitous, alert Secretary continues to remain in a vacuum, needing your assistance to air this static equilibrium with personal news, be it great or small. How reluctant we become in our maturity to narrate our eventual success, each in our respective field, yet we started forth from early limited domain, in Boston, entirely lacking the present multiple science buildings and undreamed opportunity for graduate research in all sciences. It was a time when all roads and highways were unfinished; transportation was by horse and vehicle; the telephone was only considered a business requisite; and we students studied by the universal oil lamp with its ornamental shade. Accordingly, in later active professional employment, our engineers were required to restudy and coordinate their collegiate procedure with advance in time and rapid changes of new power discoveries and their adaptability. Water power - to electricity - to nuclear energy and automation to revolutionize all business and even family life today. X-ray astronomy is a new science pioneered and developed in Boston for the last nine years. It is necessary because unlike optical and radio waves,

x-ray emissions from the universe cannot be detected at ground levels. X-rays are electro magnetic signals as radio waves and visible light waves as infra red or gamma waves. The difference in all these is the length of the wave, thus to determine what these waves can do or not do? Radio and light waves are longer than x-rays but reduced in strength by travel in space and atmosphere yet controlled on earth. So x-ray astronomers will now secure an orbiting observatory, a satellite with x-ray telescopes focused upon regions of the universe, with photographic plates to record these emissions. The study of x-rays that emanate outside our solar system may provide clues to the origin and state of the universe. Dr. Riccardo Giacconi of American Engineering Science Company of Cambridge is associated with Dr. Bruno B. Rossi of M.I.T. in its development.

A welcome letter from **J. Tyrrell Cheney**, II, informs me of the death of our classmate **Richard M. Lawton**, I, on Wednesday, August 16, at his residence in Plainfield, N. J. Tyrrell is maintaining his usual good health and celebrated his 87th birthday on June 26. We extend our deep sympathy to him in the grave illness of his wife who finally sought hospital care to improve her heart ailment. Regarding his last active employment, he states that his retirement from the Wilton planning and zoning duties in 1962, after 11 years of service, has left him more leisure time for occasional golf at Silver Springs and Williamsburg, Va. . . . A line from **Jim Welsh**, VI, still at Winter Park, Fla., announces that his winter address will be Seymour Hotel, 50 W. 45 Street, N.Y. He will also enjoy a four-week visit at the homes of his two sons and their families from August 31. . . . **William C. Lounsbury**, VII, of Fort Myers, Fla., writes that he graduated from M.I.T. with the Class of '04 but spent three years of association with our Class and remains devoted entirely to our classmates, hence is one of us. We extend our deep sympathy to Will for the recent loss of his leg, after an operation that will prevent him from his future walking.

Our Class must bear the loss of another member in **Richard Mack Lawton** after a busy career. Mack was born in Lowell, Mass., January 1, 1882. After graduation from Lowell High School he joined our Class at M.I.T. to graduate in '03. A reminiscent note now seems appropriate for during our college period the student nucleus, being meager in contrast

to present attendance, sought fellowship in fraternal life, of which there were over a dozen to overcome the absence of a campus association. Mack Lawton was a member of Phi Beta Epsilon with its fraternity house at 237 Beacon Street, not distant from our universal center of Rogers domain. After leaving his alma mater Richard entered the employment of the New York, New Haven and Hartford Railroad at New York City for many years. In 1925 he was in the contracting business as Lawton and Shea at 56 Wall Street, New York, and while here married Edith Clarke of N.Y.C. They had a daughter Mrs. Sarah Mansfield and a son Frederick who lost his life as a bomber in World War II. Richard served his country as an Army engineer in World War I for two years in France. In later years Richard was part owner of Rollstone Granite Quarry in Fitchburg, Mass., and did consulting jobs in Plainfield, N.J. But for the last 20 years he was mostly retired and enjoyed traveling abroad, particularly Switzerland. And as his wife enjoyed plants, they made a trip to Iceland to study rock flowers. Richard was confined to a nursing home in Plainfield since March. He leaves his wife, daughter and three grandsons. . . . A joyous letter from **John J. Dooley**, VI, came on June 17, and he wished his classmates to learn he would celebrate his 86th birthday on July 26. He is enjoying fairly good health but is less eager to travel as formerly. His praise for your Secretary's interesting Class news brings solace to my continuous efforts. . . . **Howard T. Graber**, formerly of So. Beverly Glen Blvd., Los Angeles, Calif., has a delayed death notice of May 1962. . . . **Fred B. Crosby**, VI, of Creighton Drive, Golden, Colo., is deceased as of May 7, 1967, from his daughter's notice. . . . **J. Russell Jones**, III, has a new address, Highland Hills Drive, Halifax, Va. . . . **Mrs. George H. Noone**, IX, (Ava M. Stoddard) lives at 28 Nobscot Road, Newton Centre. . . . Our councilor **Ike Atwood** with Mrs. Atwood has changed from foreign travel to Canada and New Brunswick this summer. —**John J. A. Nolan**, Secretary, 13 Linden Avenue, Somerville, Mass.; **Augustus H. Eustis**, Treasurer, 131 State Street, Boston, Mass.

04

I regret to have to report that I was unable to attend any Alumni Day activities this year. The heat coupled with a sacroiliac that was not responding to treatment necessitated my remaining at home. . . . Mrs. Hayward has written to **Frank Davis**, and in his letter of reply he said he spent Decoration Day at the ranch 250 miles north of Detroit with his family. Although Frank is on crutches, he does get around even to driving the golf cart while other members of the family play the game. It must be interesting country with "lots of elk, deer and fish." I understand he is quite an expert fisherman. More power to you, Frank, and best wishes from all of your classmates. . . . In President Johnson's talk

at the luncheon he mentioned the fact that the Institute gave a large number of doctorate degrees, quite different from the year 1907 when only three were given, one of whom was our own classmate, **Robert B. Sosman**. . . . **George Kaiser** was in town recently, and as usual we had a very nice telephone conversation. He reports to be in very good health and is keeping fit by devoting a large part of his time to his flower gardens. They must be beautiful.

I know you will be interested in the contents of a letter from our Vice President, **Maynard Holcombe**, which follows: "I have been intending to write you about our experience in Jerusalem during the three-day war in June which might interest some of our classmates or others who read the Class '04 notes in the *Technology Review*. I was a delegate from St. Petersburg to the Rotary International Convention at Nice in May, and Martha and I took this as an excuse to do some traveling and visiting abroad. We left Port Everglades in late April stopping at Nassau, Bermuda and Cherbourg. We spent four days in Paris and ten days in Weisbaden where we have two teen-age grandchildren in school while their parents are stationed there in the Air Force, and where we did a lot of sightseeing in that beautiful Rhine country. From there we flew over the Alps to Nice, a gorgeous spectacle with the bright sunshine on the glittering snow dazzling the vision beneath and no clouds to dim it. From Nice we went to Trieste by rail, and thence by cruise ship to Venice, Bruidisi, Crete, Alexandria and Beirut, visiting a day or two at each, particularly the museums and ruins. At Beirut my daughter met us, and as all was quiet at Jerusalem we proceeded by Mid East Airlines to Amman and drove from there over the mountains to Jordan, Jerusalem. We arrived there June 3, in time to visit Bethlehem and the Mount of Olives before the fighting began on the 5th when we were caught in the U.S. Consulate General "residence" and under gun fire for three days. My daughter's living quarters were wrecked by shells, but we escaped by crowding into a passageway on the lower floor between masonry walls two or three feet thick. I sat on a garbage can and held a big brass kettle over my head for two days and nights by candle light. The third day an Israeli patrol came in and informed us that the war was over and the Jordanians had been driven out. We could not return through Beirut as the Amman airfield had been bombed out. The Israelis let us go through Tel Aviv to Rome by El Al Airlines. We were just in time to catch the train connection to Naples for the Italian Line *Raffaello* which got us back to New York on June 16 where my son Marshall (M.I.T. '36) met us and took us to his summer place at Stone Harbor, N. J., to replenish our wardrobes. I was impressed with the thoroughness and speed with which the Israeli's conducted their operations, and with the spirit they showed in their victory. As we drove through Jerusalem and Tel Aviv, and in the small places

along the way, everyone seemed to be on the streets welcoming the returning troops and celebrating their way of life—a mixture of Christmas, New Year's, St. Patrick's Day and the 4th of July. The pilgrimage to the Wailing Wall was illuminating, old Jews in long black coats and skull caps and children garbed like those in our streets at home mingled with joyous groups of all ages and both sexes, all proceeding on foot. It was clear that the entire population was of the same mind, never to permit their holy city to be taken from them again. Now that we are safely home and have recovered from the daze that we seem to have been under during our siege and escape from the war zone, we have no regrets or hard feelings about our misadventure—indeed we feel pretty good about it as we now appreciate the situation in Israel and can sympathize with both the Jordanians and the Israelis."

A news clipping tells of classmate **Daniel F. Comstock** who was elected Chairman of the Board of Comstock and Wescott. He was formerly president. . . . *The American Metal Market* has an article on a new reference book, *Winning of Nickel*, published in Canada and the U.S. under the sponsorship of the International Nickel Company. Among the distinguished authorities on the technology of nickel who contributed to this volume is our late classmate Professor **Carle R. Hayward**.—**Eugene H. Russell, Jr.**, Secretary, 82 Stevens Road, Needham, Mass.

05

Each year at this time general conversation in this area is as to which weekend is the tops of the foliage season. There seems to be no agreement, and one never remembers enough about last year's glorious display to make an accurate comparison with this year's. Yet many comparisons are made, and all agree that this section of Carroll County has the very best anywhere. So be it. Each year at this time our front door chimes peal out, and there stand Helen and **Dean Klahr**, all the way from Erie, Pa., to see the foliage and friends and kin in and around Littleton, N.H., and Newburyport, Mass. Both seemed in real good shape. Dean had driven all the way in two days, more than I would care to do. Helen's fractured ankle (reported on for the last two years) is "as good as it ever will be," and she ambulates with little trouble. We hope that others while in this section will make us a call. . . . Through **Win Taylor's** daughter I can quote on his death: "Summit—Winifred A. Taylor of 41 Valley View Ave. died yesterday in Overlook Hospital. He was 84. Mr. Taylor was born in Lawrence, Mass., and moved here 47 years ago. He retired in 1947 as an appraisal engineer with the New Jersey Bell Telephone Company after 42 years with the utility. Mr. Taylor was a member of Phi Gamma Delta fraternity, Telephone Pioneers of America, and the Old Guard here. He leaves three sons, Roger C. of Chatham, Ralph

A. of Summit and William A. of Riverside, Calif.; two daughters, Mrs. John M. Wittke of Westfield and Mrs. Richard B. Cross of Summit; three brothers, a sister, 11 grandchildren and two great-grandchildren." She adds that he had been able to control a threat of cancer for 14 years without appreciable discomfort.

Through his daughter-in-law I learn more about the life of **Chester Allen**, I, whose death in March 1967 was recorded in a previous issue. Lacking a newspaper article, she has given me this account: "Pop entered my life in 1941 when he married my mother. He as at that time head of the Civil Engineering Department at Michigan State College. He retired in 1949. For the years of 1949 to 1951 he taught at a small upstate New York Technical College. In 1951 they returned to East Lansing, sold their home there, and bought a small home in Olivet, Mich., which is 30 miles south of Lansing and has a small college. For a number of years he was affiliated with an engineering firm in Jackson, Mich., as a consultant. He became interested in affairs of the City of Olivet (which is only some 1500, exclusive of students) and eventually became Justice of the Peace for the city. He was still busy with that occupation at the time of his really sudden death. He was a dear man!" —**Fred W. Goldthwait**, Secretary, Center Sandwich, N.H. 03227

06

This month, December, doesn't seem to be a proper time for including a number of careers, and I'll just repeat my message of a year ago. "Looking out at the colorful autumn foliage [especially beautiful this year] it is hard to realize that when you read these notes Christmas will be only a few weeks away. With our best wishes for a happy holiday and a New Year full of interest and satisfaction, from Marion and—**Edward B. Rowe**, Secretary - Treasurer, 11 Cushing Road, Wellesley Hills, Mass. 02181"

07

The latter part of August your Secretary mailed a five-page detailed report of our 60th Reunion to each member of the Class on our mailing list and also a roster of the living members of the Class, corrected to June 1, 1967. It has been most encouraging to receive letters of appreciation from various members. These letters in some cases contained a check to help carry on the Class work.

As these notes are being written at the end of September your Secretary and Mrs. Walker have just returned from a vacation on Cape Cod. We were able to call on two of the '07 members. **Bill Otis** has a very beautiful home at North Chatham which is winterized so that, if necessary, he can remain there the year round. He has owned this home a little over two years and has done a

great deal to make it extremely livable. The garage, originally a part of the house, has been made into a family room with fireplace. A newly constructed two-car garage has been divided so that one half is a workshop, which contains every carpenter tool known to man, where Bill can build or repair all types of furniture, antique as well as modern. He showed us some very beautiful and valuable old chairs undergoing a face lifting. Bill, like so many of us, has been hard hit with arthritis and has difficulty in getting around, even with a cane. He regretted that he could not make Boston for the Reunion, but I can understand his problem of navigation. Mrs. Otis has had some heart problems and also has to be careful not to over do. We spent an hour on their marble patio looking out to sea and answering many questions about our former and present classmates. We reviewed together many of the events held by the Class since graduation. Out of the 15 reunions held, Bill was able to attend eight.

I have not missed a year in calling on **George Griffin** at Woods Hole since he moved to the Cape to become General Superintendent of the Falmouth Water Company, from which he is now fully retired. George is one of the older men in our Class, having celebrated his 85th birthday last January. He also is afflicted with arthritis and finds a cane helpful for steadiness. He is fortunate to have a married son and a married daughter living in Woods Hole near him so that he can see the grandchildren often. . . . A letter from **Herbert A. Sullwold** in California tells of a broken hip in 1962, but goes on to say that although 84 last August he is able to do gardening work every morning. He does not use a cane. He does not drive his car because of California's law allowing him only \$25,000 insurance coverage. . . . Although **Willis Waldo**, I, is over 84, he is still very active in construction work. He operates a structural engineering business in West Palm Beach, Fla., and also is engaged in a small mining operation in Central America. After graduating from the Wyoming, Ohio, High School in 1901, he spent two years working before taking his freshman and sophomore work at Purdue University. He then joined our Class in our junior year. I quote from one of his recent letters: "Some memorable features of my experience included a soil survey of the Philippine Islands as a place for raising ramie, a study of fiber preparation in China and Japan, a bad night in a storm on the Aleutian Islands in Alaska, a tarantula bite (which nearly cost me a leg) while living on the second story of a small frame house near Harlingen, Texas, with the Rio Grande coming in the front door and going out the back door, later, riding horseback in Panama trying to find an abandoned mine out in the jungle. I keep going because I would rather wear out than rust out." . . . **Allen Pope** wrote me a long and interesting letter from his home in Washington, D.C., explaining why he could not make the Reunion this year. He has a large number

of grandchildren who all visited him this past summer. Allen writes of himself, "I seem to be in pretty good vigorous health. I was run down on a street crossing about five years ago and never knew that I was hit until I awoke in a hospital. Injuries to my back and feet plague me still, but I walk three miles every morning and keep pretty fit."

The envelope with the Reunion report I sent to **Frank E. Hamilton** was returned to me by his son, William H. Hamilton, with a note saying his father passed away December 28, 1966. I wrote a sympathy letter to the family. . . . When I sent out questionnaires for our 60th Reunion, **Kirk W. Dyer**, X, wrote that he and **Jim Gaylord**, VI, were planning to attend their 65th Reunion at California Institute of Technology in Pasadena, Calif., which would occur at about the same time as ours. Originally there were only three members in this class of 1902, and our two classmates are the oldest surviving members of any class at Cal tech. As Jim is in a convalescent home in Pasadena, Kirk had to accept all the honors for both. This school had five previous graduates, 1896-1900, given bachelor of arts degrees. In 1901 the first B.S. was given. Kirk received his B.S. in chemistry. At the end of the Seminar Kirk was introduced by Dr. Jones "as being the oldest alumnus who had come the farthest." When President DuBridge introduced Kirk the next evening at the alumni banquet, he was given a standing ovation. They considered it a great demonstration of loyalty for Kirk to give up his 60th Reunion at M.I.T. to go to California to a 65th at Cal Tech. Kirk visited with Jim Gaylord three times and was recognized each time and was able to talk over old times at Cal Tech and M.I.T. Jim is taken to the gym in his wheelchair each day for exercise on parallel bars, etc., by his male nurse. Kirk also visited with Jim's married daughter and son.—**Philip B. Walker**, Secretary and Treasurer, 18 Summit Street, Whitinsville, Mass.; **Gardner S. Gould**, Assistant Secretary, 409 Highland Street, Newtonville, Mass.

08

Our 59th Reunion was held at Melrose Inn, Harwich Port, Mass., June 9, 10 and 11, returning to Cambridge June 12 for Alumni Day. The following were present at some or all of the doings: Bunny Ames, Bill Booth, Nick Carter, Myron Davis, Leo Loeb, Howard Luther, Miles Sampson, Frank Towle and Joseph Wattles. Mrs. Davis and Mrs. Wattles were guests. . . . Our 60th Reunion will be held at Melrose Inn, Harwich Port, Mass., next year June 7, 8 and 9, returning to Cambridge for Alumni Day June 10. Make your plans now to attend. Ladies are invited. . . . We are sorry to report deaths of **Charles A. Kraus** on June 27 and **William B. Hunter** on June 19.—**H. L. Carter**, Secretary, 14 Roslyn Road, Waban, Mass. 02168; **Joseph W. Wattles**, Treasurer, 26 Bullard Road, Weston, Mass. 02193

As we stated in the October-November notes, owing to space limitations we were obliged to defer some items until now. Leo Loeb, '08, of New York sent the Alumni Office a newspaper clipping from the New York Sunday Times which related more of **Molly Scharff's** career than was available when we prepared the copy for the July Review. "Mr. Scharff was a field engineer of the New Jersey Board of Health in 1911 and was with Morris Knowles, Inc., consulting engineers, in Pittsburgh from 1911 to 1921, becoming a Vice President. He was Valuation Engineer and later Chief Engineer in Pittsburgh with the Philadelphia Company and affiliated corporations from 1921 to 1925, and Chief Engineer in Pittsburgh for the Byllesby Engineering and Management Corporation from 1925 to 1927. Mr. Scharff was a former president of Technology Clubs Associated, an organization of alumni of M.I.T., and a member of the Cosmos Club of Washington and the City Club of New York." As we all are aware, for the past several years Molly maintained an office as a consulting engineer and was active in electrical power plant developments both in this country and in Europe and Asia. . . . In the early summer we were pleased to receive a note from **Elliot Q. Adams** telling of the honors that he has received and his present activities. "A couple of years ago I was made an Emeritus Fellow of the Illuminating Engineering Society and went to Detroit to receive the award. I am also on the emeritus fellow lists of the Optical Society of America and the Washington Academy of Sciences. Last year I retired for the second time, the first time from General Electric, Nela Park, 1949, and then from Western Reserve University, Research Associate in Ophthalmology, 1966. Currently I am working three days a week at Human Engineering Institute, Inc., a non-profit group that prepares material for programmed learning. (It started as a project of Republic Steel.)" The Class congratulates Elliot on his achievements and honors.

We all know how well **Ruth and Leon Healy** maintain their interest in the Class and come all the way from Milwaukee to attend our reunions. We have received the following most interesting letter from him. "I was exceedingly grieved to learn that our President Maurice Scharff had passed away. We shall miss him very much. I believe that the new slate of Class officers is very satisfactory. We have been fortunate in having good officers for the past years. In reference to the choice of location for the 60th Reunion, Ruth and I have enjoyed the intimate fellowship of a hotel lounge and dining room. However, we are all growing older and some probably find transportation more difficult. Ruth and I have stopped several times at the Charter House on Highway 128 just west of Waltham and found it an easy ride to Cambridge. It is immaterial to us, and we are agreeable to whatever is decided

upon. I am pleased to report that both Ruth and I are quite well. We hope to be able to attend the 60th Reunion. It has been a busy summer for us so far. In June we had the pleasure of attending graduation exercises at Akron University and seeing our son Jim receive his doctor's degree in chemical engineering, and the next week we attended the graduation exercises at Carroll when our granddaughter Ruth Ann received her B.S. degree in biology. A few weeks later Ruth and I celebrated our golden wedding anniversary. We are just getting our breath now. We certainly have a great deal to be thankful for."

Elmo Robinson is one of our classmates who has chosen the ministry as his profession. We have received the following note from him. "Although I am remembered by nobody at M.I.T. and probably by none of my classmates, here goes for a brief item about myself. I am still twice and only twice emeritus: Professor of Philosophy, San Jose State College, and Minister, Unitarian Church of Los Alamos. Here in New Mexico 121 Fort Union is my residence. A small pamphlet on *Understanding Religion* was favorably reviewed in the Unitarian Universalist *Register-Leader* for July. But I have been working chiefly on a history of Universalism, to be completed this autumn. The church here staged a delightful celebration of my 80th birthday in January, and in June friends in California gave us a party to celebrate our 25th anniversary." Although Elmo states that he is remembered by none of his classmates, from time to time there has been news of him in these notes.—**Chester L. Dawes**, Secretary, Pierce Hall, Harvard University, Cambridge, Mass. 02138; **George E. Wallis**, Assistant Secretary, Wenham, Mass.

10

We have received a clipping from the Alumni Office telling of **Frederick Dewey** who died in New York July 27 at the age of 80. He prepared for the Institute at University High School, Chicago, and attended the University of Michigan. At the Institute he was Secretary of the Mechanical Engineering Society and was active on the Tech News Staff and the Tech Show. After graduating from the Institute he earned a doctorate in sociology at Columbia University where his father, John Dewey who made many contributions to modern education, taught. (John Dewey was a brother of our economics professor, Davis R. Dewey, father of Brad.) In the 1920's and 1930's he was Vice President of Farmer's Loan and Trust Company and later became a partner in the stock brokerage firm of Dewey, Bacon and Company. From 1936 until his death he was investment consultant with a number of companies. His wife, Elizabeth, a son and two daughters survive.

Francis Briggs Silsbee, former Chief of the Electricity Division of the National Bureau of Standards, passed away in

Washington, D.C., on August 1. He started with the Bureau in 1911 and retired in 1959 but continued on the staff as a consultant. He was the chairman of a committee that helped to establish the Bureau of Standards Museum. It exhibits instruments used and devised during the Bureau's 66-year history. Dr. Silsbee made many contributions in the field of electrical engineering, notably in the design of alternating current resistors of exceptionally low reactance capable of carrying very large currents. He won several awards including the Morris E. Leeds Award for his contribution to the methods of commercial electrical measurements, the U.S. Department of Commerce Exceptional Service Award for outstanding service to the nation, and the U.S. Naval Bureau of Ordnance Exceptional Award for service in developing naval ordnance equipment. In 1956 he was sent to Ethiopia by the International Cooperation Administration to advise the Ethiopian government on the establishment of a national system of measurement standards. Dr. Silsbee was a fellow of the American Physical Society, President of the Washington Philosophical Society, and President of the Washington Academy of Sciences.

Hiram E. Beebe writes from California: "Your card was received, and there is not much to report although I contacted the two Audubon societies, Los Angeles and the San Fernando, the latter being the successor to the ancient California Audubon in whose name the Tucker Bird Sanctuary is still. I was chairman of that for two years, and it is the location of many of the hummingbird pictures in Greenwalt's book, M.I.T. '22. The Hollywood Bowl Easter Sunrise Program Committee still remembers Mrs. Beebe and myself as in charge of getting the thousands of Calla Lilies seen in the TV broadcast and expanding the area from which they are donated. I am Treasurer of the Interfraternity Association of Southern California but, in general, am an 'ex' but busy at many cultural things in the Los Angeles area. We M.I.T. governors will welcome the visit of any M.I.T. grads at our monthly meetings, the 4th Monday (noon luncheons) at Roger Young Auditorium. We are probably the most closely knit of any alumni club of M.I.T. in the world, about \$4,000.00 cash on hand and live officers. President George Cunningham, '27, is on a round-the-world trip with his wife Betty, but Marty Chetron, '56, is at the helm following his producing the very successful and good looking 1966 directory."

Bob Burnett writes that his only claim to attention is that he now has two great grandsons. . . . **Cecil Blanchard** writes: "Edna and I just celebrated our 57th wedding anniversary. Seven of our grandchildren and great grandchildren came to see us. I made them all stilts (which we seldom see today), and soon they were stumping around as expertly as we used to be 70 years ago. Saw my 5th grade teacher last summer who is 100 years old and still alert." . . . **Phil Harris** writes: "I retired from business about

ten years ago. My business life as an architect in Wilmington, Del., was extremely happy. It is a lovely city. My contacts with powerful business men were very pleasurable. It is quite a sensation to see some big buildings and to realize they started as figments of imagination in my little head! Cordial regards to classmates." . . . **Alva B. Court** writes: "You deserve better support than your news gatherers are giving you! So I resolved to dig some news up for you if I could about the activities of the thin grey line of '10 men. I am sorry to have to report that I have not been able to get any so far."

Henry J. Perry, Braintree, Mass., passed away on December 12, 1966. . . . **Clifford E. Snyder** died on February 10, 1967. . . . **Lester C. Greenwood** has passed away. . . . **Robert W. Bayle** writes from Glens Falls, N.Y., that he is still enjoying life at 79 and is semi-retired. . . . **Jim Tripp** writes that he still travels and works. The N.Y.C. luncheon group has been reduced to **George Magee** and himself. . . . **Stuart Chase** writes: "You are breaking my heart! Sure I have a little news. I'm working hard on a new book to be called *The Most Probable World*, what does it promise to look like in, say, AD 2000? I'm still playing tennis at 79, doubles only, and am in the local tournament with a spry youngster of 55. I am Secretary of our Town Planning Commission and we are keeping the fast buck subdividers at bay!" . . . **Joe Northrop** writes: "Being 81 years old, I am about retired, though I go to the office every day. Guess my work in this world is about done! Have been listed in *Who's Who in Engineering* since 1931, and one of my churches won an "Honorable Mention" in the church building competition held by the Bureau of Church Planning of the Christian Herald. Had a stroke about six years ago, and have not been able to drive my car since; so don't get much done these days. The M.I.T. fellows get together once in a while down here in Houston, but most of them are the younger set. Give my regards to any of the 1910 fellows that you see."

Ralph W. Horne writes: "This is in reply to your recent plea for some live news regarding the members of Class of 1910. You certainly deserve help from all of us who are still surviving. I cannot believe that we are so inactive that there is nothing to write you about. Being semi-retired from Fay, Spofford and Thorndike, Inc., where I was President until a few years ago, my regular office hours are now from 10 a.m. till 4 p.m. I have given up some of my outside activities. However at present I am President of Northeast Chapter of American Institute of Consulting Engineers. In my home city of Malden, Mass., I am on the Board of Directors and the Trust Investment Committee of the First National Bank, also an Advisory Trustee of Malden Savings Bank, also a Trustee and Auditor of Malden Public Library, a Trustee and member of the Executive Committee of Malden Hospital, and also President

of Davenport Memorial Foundation, a corporation which operates a charitable rest home for persons over 65 years of age. Last spring my wife Meta and I found time for a couple of weeks in Florida. At the last Alumni Day annual luncheon of M.I.T. we were disappointed in the small representation of the 1910 Class. We missed a number who have attended regularly in the past. We quite often see **Murray Mellish** and his wife Eva who are neighbors of ours in Malden. They always have a fine display of flowers on their grounds during the summer." —**Herbert S. Cleverdon**, Secretary, 120 Tremont Street, Boston, Mass. 02108

11

Last June **Fred Harold Daniels**, Honorary Chairman and Director of the Riley Stoker Company of Worcester, died suddenly. He was born in Worcester in 1887, attended Worcester schools, Worcester Academy, and Bryant & Stratton College. He received a bachelor of philosophy degree from Yale in 1909 and graduated with us in electrical engineering. Following graduation he worked for the Sturtevant Company in Hyde Park and in 1913 joined the Riley Stoker Company of Worcester which had just been founded by his father. He became President of the company in 1926, Chairman of the Board in 1949 and Honorary Chairman in 1960. He was chairman of trustees of Worcester Academy and had been their secretary and president. The academy gymnasium was named for him, and in 1955 the alumni gave him their Achiever Award. In 1950 the Fred Harris Daniels Foundation took over the Academy's entire debt of \$33000.00. Harold was a trustee of Worcester Polytechnic Institution from 1935 to 1941 and since then a life member of the Corporation. The Institution honored him with a degree of doctor of engineering. Daniels Hall at W.P.I. was named for his father. For the past 11 years Harold was a trustee and member of the executive committee of Nichols College where a dormitory was named for him. Harold was a councilor of the American Antiquarian Society of Worcester and a former trustee of Bancroft School. He was a trustee of the Worcester Natural History Society and donated their building, Daniels House, to them as well as 340 acres of land in Rutland. Harold was a 33d degree Scottish Rite mason, past president of the Worcester Chapter Red Cross, and director of Worcester County National Bank, State Mutual Life Assurance Company, and the Worcester Home for the Blind. He held memberships in Worcester Club, Tamuck Country Club, Engineering Clubs of Worcester and New York, Woods Hole Yacht Club, Woods Hole Oceanographic Institution, Laurel Book Club and was a fellow in the Society of Mechanical Engineers. In a talk last March Harold said: "Money is made to use for other people and I have tried to do that all along." He is survived by his wife, Eleanor G., a son, Bruce, and a daughter, Mrs. Samuel C. Bronson.

Sallie Denison writes that she became a great grandmother on September 16 to Kristeen, the daughter of Lincoln Denison Baron. . . . **Don Stevens'** mother will be 100 years old on January 5. She is living with Don's wife Lois in Ridgewood, N.J. She accompanied Don and Lois to the last 5-year reunion that he attended at Snow Inn. . . . **Daniel J. Smith** received his Fifty-Year Membership Certificate in the American Chemical Society last summer. . . . **Kenneth Faunce's** wife, Grace, died September 27. . . . **Morris Omansky** reports he has one grandson, a sophomore, at M.I.T. and another who is a freshman at Harvard. —**Oberlin S. Clark**, Secretary, 50 Leonard Rd., North Weymouth, Mass. 02191

12

Greetings from your new Scribe! We are most pleased at the initial response to our request for Class news. With such a good start we are sure that others will help in keeping this column well filled. One classmate writes, "This is my first contribution. I do not like to write letters and have always left this to others. However after I got started, it was easy and I liked it." The only way for you to find out is to try yourself. We have found that there are still a number of men who have not yet retired. In the *Real Estate Appraiser* of Chicago there is a recent article on "The Appraiser and Mortgage Lending" by **Henry A. Babcock** which he presented at the Federal Savings League of New England last fall. He is the author of numerous technical articles on land economics and city expansion, and lectures on such subjects at the Universities of California and Southern California. . . . A note from **Jesse Hakes** outlines his activities since graduation. He writes, "I took the R.R. option in Course I, and Pop Allen gave me an application blank from the B&O R.R. where I started in a student training course to cover 5 years at \$85 per month. I was furloughed in 1913 and did not return. I then worked for **Gerald Howard**, I, for six months in Nashville, then accepted a position with the Baltimore Tube Company with whom I worked for nine years, both in production and sales. In 1923 I decided to go on my own as a manufacturer's agent, and in 1926 I started the Baltimore Tool Works, an enterprise which I carried on through the Depression and World War II. After 30 years I retired to my place in Glenwood, 20 miles west of Baltimore, which you visited 10 years ago. [Note.—Jesse's "place" is a beautiful old Maryland estate with farm and nursery, and a charming old Colonial type home which has been modernized and kept in wonderful condition.] I run a commercial nursery, raising azaleas, rhododendrons and allied products. I have a 250-acre farm which I rent except for the grounds about my home and the nursery. There are also five tenant homes. This is far too much, and I wish I could find a way out. Mary and I have done quite a bit of traveling. We have taken two world cruises, one to the Far East and

one called a four-continent cruise with interesting side trips to Africa, India, Bali, etc. Our last trip, a year ago, was to the North Cape. We were married in 1942 so have just celebrated our 25th anniversary. We have no children, but Mary has a son by her first marriage and lots of grandchildren." We agree with you, Jesse. Looks like you have a tiger by the tail and can't let go.

A welcome letter from **Rudolph Fox** reads, "I am sorry to learn from you that **Fritz Shepard** has resigned as our Secretary. Never was a man more long suffering with a reticent lot of classmates. I wish you luck in your new job and hope that more contributions may be forthcoming considering our years and the inclination of such to reminisce. My first efforts after graduation were with the Fafnir Bearing Company of New Britain, Conn., then having a payroll of about 50 people. Seeking to improve the product of a very young domestic industry was an interesting job. Then came World War I which I spent in Washington and at the old Springfield Armory in the metallurgical section of the Ordnance Department. With the end of the War I married Karen Irene Denton, the sister of William B. Denton, VI, '11. Following another short period in the ball bearing field, I purchased an interest in the Vulcan Iron Works Company of Denver, makers of mining machinery. There I was Vice President and President until this family company was sold to Dorr-Oliver Company in 1952. After acting as manager and consultant for seven years I retired. Our daughter, Phyllis, received her doctorate from M.I.T., and has two sons. Our son, Denton, received a similar degree from Yale and has one son and three daughters. They are both college professors and live in Short Hills, N.J., and Toronto. Kind regards and best wishes for many responses."

Harold Brackett writes to tell the sad news of the passing of **Harris E. Dexter**, Course VI, which occurred on April 29 at Poughkeepsie, N.Y. He died quite suddenly from a heart attack following an operation a few days earlier from which he was making a fine recovery. He is survived by his daughter, Caroline, who had just received her doctorate from Columbia, and by a son, Harry, Jr., who is with Boeing on the West Coast. . . . We were saddened to learn that **Alvin Thompson** is not in good health, and after a long siege in the hospital is back on his feet but still under therapy and living at a nursing home. He says that he went with the Pennsylvania R.R. in 1913 in the Motive Power Department as an inspector, traveling about the eastern part of the country most of the time. He served as Lieutenant Proof Officer in World War I and then returned to the Pennsylvania R.R. until 1922 when he accepted a position as test engineer with the Norfolk and Western. This entailed road tests with a dynamometer car on the large locomotives throughout the system. He writes, "Many of our steam engines developed 5500 hp at 50 mph., and it was quite a thrill to speed

along on one of these monsters at night when all one could see was about 50 feet of glistening rails." Alvin would like to hear from any who can write or visit him. His address is Friendship Manor, 320 Hershberger Rd., Roanoke, Va. 24012.

We received a long and interesting letter from **Bartow Reeves** who retired in 1959 from the New Jersey Zinc Company in Palmerton, Pa., where he spent nearly all of his career, mostly in the Research Department. We quote in part, "Congratulations on your new job. Perhaps you are to be commiserated, too, but I shall try to give you a hand. Since retirement I have become quite active in the American National Red Cross, particularly in the Blood Bank Program in which for five years I served as Chairman for the Palmerton area. Bea and I have enjoyed reasonably good health and several years ago spent nearly two months driving out to the West Coast with stops at many tourist attractions and in the national parks. In 1964 we took the Grand Tour in Europe with a group of 30, crossing over on the *Queen Mary* and back on the *Queen Elizabeth*. I have for many years been considerably interested in church work, serving on several committees and as a convention delegate. We go to church regularly and I recommend it. For exercise I wage a constant struggle with the crab grass and various garden pests. I am also a pretty good tinkerer. I still play a little golf but only nine holes at a time. Bea is a good cook, which I appreciate as much as ever. She is also an excellent bridge player, and I can trail along when necessary. We have one son, Thomas, who graduated from Yale in 1944 and served in the World War II as Ltjg. He is now with a management consulting firm in Chicago and is married. I have three grandchildren, a boy and two girls. The boy is in Blair Academy, and the older girl in Garrison Forest School. We drive out to see them every Christmas. The covered bridge sticker on your letter reminds me of the sign in the washroom at the golf club, "Boys, keep America beautiful. Get your hair cut." . . . Our deepest sympathy to **Fred Allen** in the passing of his wife Marion on August 15 after a short illness with acute leukemia. Fred writes that only five months before they had returned from a most enjoyable round-the-world tour through the Middle East and Hong Kong just ahead of the troubles in those areas.

A brief note from **Bill Rhodes** forwarded from the Alumni Association states, "I am now working full time on a non-mathematical statement in English on capitalism! None now to be found, either in books or papers, on this most simple and easy subject. Correspondence invited." . . . I was pleased to receive a phone call from **Hugo Hanson** last September when he and Edith were on a flying trip to Philadelphia from Myrtle Beach, S.C., where they have been living since his retirement about two years ago. He has agreed to write a letter reviewing his activities in time to publish in the next issue. . . . And from **Harold**

Mabbott, "In response to your persuasive solicitation, I will try to bring you up to date on my activities over these many years. After graduation **Al Davis** and I took a job with the Peerless Automobile Company in Cleveland under the supervision of Don Stevens, '11, at \$75 a month. I left Cleveland in 1915 and worked a few months at Pratt and Whitney in Hartford, then taught at Northeastern for two years under Carl Ell, '11. With the approach of World War I, I became interested in the Army as a career and secured a commission in the Coast Artillery in 1917, serving most of the war period in France. The army sent me to Tech in 1928, as major, for some interesting graduate work in math and acoustics in preparation for two years' work in underwater sound experimentation. In World War II I served for about two years for the Coast Artillery overseas. I retired from the Army as colonel in 1947. I then spent a few years with a small local concern in design and sales work and did some part time teaching at the Pennsylvania Military College as instructor in physics. I was married in 1915. I have two daughters. The older, Ann, lives in Philadelphia and the younger, Helen, is married and lives in Topeka, Kansas. She has two sons, the older graduating from Annapolis this year. I live alone but spend much of my time making short local trips with friends, occasionally picking up a lobster on the Jersey shore to bring home and cook. I could give you a list of the worst restaurants between Portland, Me., and Savannah, places which are listed as desirable in travel books. Last fall when driving through southern Maryland I enjoyed a most pleasant visit with Hannah and **Ralph Ferry**, and it was a shock to learn of his death this spring. I did make Expo 67 this summer, but after one busy day standing in line for some two hours at each exhibit, I decided life was too short and departed. I am in good health for which I am thankful. My hearing is still good enough to know when the cellar sump pump is running, when the planes are passing over at 3 a.m., and that the neighborhood dogs are still alive at midnight and at 5:00 o'clock. I was sorry not to make the Reunion this year but am waiting for the next one." . . . This concludes the news received to date. Don't forget to send in an article for the next issue. Write to Ray or Jay.—**Ray E. Wilson**, Secretary, 304 Park Ave., Swarthmore, Pa. 19081; **Jay H. Pratt**, 937 Fair Oaks Ave., Oak Park, Ill. 60302

13

Is it too early to wish all of you a very Merry Christmas? Nevertheless the Capens wish you the merriest of holidays. Well, you must have received President Charlie's letter together with the Alumni Association's Fund Report for 1967. Well done. . . . We have received a recent letter from **Ken Blake**: "I'm sorry to report that we now have a new oldest living member of 1913. I just received a letter from his wife telling me of the passing of **E. Gordon Taylor**. He had

had a slight heart condition since last spring but wrote me very recently that he was feeling fine. But on September 11 he returned from his daily sunbath on the beach and lay down for his usual nap. And he never awakened again in this world. So someone, was it **Al Hurst** who now must take over? Long live the oldest member." Yes, Gordon was the oldest and Eddie Hurst appears to rank next. We shall miss Gordon's cheerful letters, and we extend to Mrs. Taylor the heartfelt sympathy of the Class of 1913. . . . A very nice letter was received from **Jack Farwell**, and we quote in part: "I was interested in **Charlie Thompson's** recent letter and the reservation June '68 at Coonamessett. You did a good job in getting a reservation because so many others make reservations so far in advance these days. Our '13 ranks have reduced causing sad thoughts, but I am looking forward to another reunion. For this one I am sure each one will make the very maximum effort to be there. I am sure they will. With all the best to the Capens." The bills for dues together with a reminder of our 55th Reunion at Coonamessett Inn will be sent out shortly.

John I. Mattill, Editor of the *Technology Review*, has informed your Secretary that the Executive Committee of the Alumni Association has voted to distribute the Review to 8,000 additional alumni this year as 1967-1968, to the following: Those contributing to the 1967 Alumni Fund; those who gave to the Fund in 1965 and 1966 but not in 1967; all other "active" Alumni of the Classes 1918, 1928 and 1943 celebrating their major reunions in 1968; all former Alumni Fund givers over 50 years graduated who are not otherwise covered above (Active means those who have M.I.T. degrees and/or those who have contributed in the past). . . . The M.I.T. Club of Boston has started this year with the monthly meetings on the last Thursday of each month through June. All of '13 either in the vicinity of Boston or visiting should drop in at the Union Oyster House, 41 Union Street, at 12 noon. Charles Thompson and your Scribe meet at this gathering frequently. President Charlie is the bearer of great news. Janet Mattson, **Bill Mattson's** daughter, has decided to give up her solo life and has taken on a husband. Janet Mattson and Frank W. Pillson were joined in holy matrimony on Monday, October 9, 1967. All of us who have known Janet and the Capen family especially congratulate her and that lucky man and wish them all the luck and happiness that is possible. . . . Well, to all of you, your wives and sweethearts, keep us informed of your present and future activities. Happy New Year!—**George Philip Capen**, Secretary and Treasurer, 60 Everett Street, Canton, Mass. 02021

14

We hope that you who follow the Alumni Fund news have noted the nice total which this last year's 1914 figure reached.

We have a hunch that our efficient Class Agent, Dinny, should take a deep bow for his efforts. His contacts frequently bring in interesting news items. For example, the European trip of the **Francis Whittens** last spring. He has also let us have an interesting letter from **Jim Reber** from Houston, Texas, who has been retired 10 years but then goes on to explain how he puts in his time—of course a little business but not enough to spoil two or three golf games a week and occasional excursions to Mexico City or California. . . . In a note to Dinny with a letterhead the County of Allegheny, Pittsburgh, Pa., Department of Public Works, **Levi Bird Duff**, Director, notes that since his daughter Nan who has been a fairly regular attendant with him at our reunions and Alumni Day is now in Seattle, he may not be able to attend Alumni Day.

A few new addresses: Leonard L. Stanley, Barnes Road, Washington, Conn. 06793; Earnest Kerr, Mandalay Shores Apts., Apt. 1024, 880 Mandalay Ave., Clearwater Beach, Fla. 33515; Edward Steere, 1212 N. Stafford St., Arlington, Va. 22201; Thorne Dickinson, back to his New York address for the winter, Hotel Woodward, Broadway and 55th St., New York 19, N.Y. Thorne as a backwoodsman in Westchester County for more than half the year has become a strong proponent of the "Preserve the Forest" philosophy, which is an issue in a section of the new proposed New York State constitution. He winds up his winter habitation notice, "provided that big bad black bear doesn't eat me. A lot of people have seen him prowling around in a suspicious manner. Our State Constitutional Convention has just voted 'Forever Wild'." As a historical note, we attended as a delegate from M.I.T. President Reynold's inauguration and the conference on "Changes in the Secondary School Curriculum and the College Response" at Bates College, Lewiston, Me. It was an interesting cap and gown affair with about 100 schools officially represented. . . . **Harold A. Mayer** of



George E. Whitwell, '14, retired Vice President of Philadelphia Electric Company, who died July 5. (See October/November Review page 95).

Seattle notes that his son Dennis has graduated from the Gonzaga University in Spokane and will attend the University of Oregon Medical School in Portland. . . . We have a note from the Alumni Register: **Donald W. Parsons**, who spent a limited time with our Class, died on May 26. His address was 15 Harding Court, Melrose, Mass., but our records do not give further details. . . . A news clipping from the Middlebury News Letter shows a picture of Mr. and Mrs. **Egbert C. Hadley** on the occasion of their 50th wedding anniversary on June 16, 1967. Bert has been a member of the Middlebury College Board of Trustees for the past 31 years and a Chairman of the Board since 1944.—**Herman A. Affel**, Secretary, Rome, Maine, P.O. address: RFD 2, Oakland, Maine 04963

15

We've had the sad loss of our second "Lowell Twin." **Reggie Foster** died on October 2. This was only a few days after he had attended our September 22 Boston Class dinner and seemingly was in good spirits and good health. But during the past couple of years he had had some severe surgery and long hospitalizations. Always a ready and generous supporter of all Class and Alumni activities, Reggie was outstandingly popular and well liked. With **Chet Runels** from Lowell, he made up the "Lowell Twins" at our dinners and reunions. In 1965 he retired as a partner from the Fred C. Church & Company, an insurance firm. He had been active in many civic and community projects and a director in several industrial firms. Barbara Thomas and Mary Scully with representatives from our Class attended the services at All Souls Church in Lowell, and we have expressed our sympathies to his family. We'll miss him. . . . **Whit Brown** has been chosen for inclusion in the 1967 edition of *Outstanding Civic Leaders of America*. This is an annual biographical compilation of approximately 6,000 civic leaders from all parts of the nation nominated by local city officials, Chambers of Commerce and civic groups as having distinguished themselves to the point of being outstanding. Whit has served the community of Concord, Mass., for many years in many official capacities, both as an elected officer and appointed board member. Congratulations to Whit for this richly deserved recognition and honor. . . . Early in September **Ben Neal** was the guest of the Alumni Association officers at a dinner at the Faculty Club to discuss Reunion Fund raising. With the magnificent job Ben did for us on our 50th Fund, he certainly was well qualified to advise them how to do it. Ben stayed over with us—a pleasure to have him. Last summer Fran and I spent a few days with Ben and his daughter Barbara at his summer place on Cushing's Island in Portland (Maine) harbor, a delightful visit.

Joanne and **Bur Swain** have left the land of snow and ice and cold winds to settle in Southern Pines, N.C., where at

480 North May Street they will be glad to see any classmates driving to and from the South. They like it down there and are glad to be free from the pressure of New York. But we'll miss them both at our Class gatherings. With **Larry Landers** Bur always set up our annual New York Class dinner to be a successful and enjoyable party. The Class Supreme—25 classmates and guests proved this again at a Class dinner September 22 at the M.I.T. Faculty Club, Cambridge. Another enthusiastic, lively and enjoyable meeting opened with the old Pirate, boarding cutlass and all, leading a rousing "we are happy" cheer. Cocktails and a delicious **Bill Morrison** dinner put us all in a pleasant and nostalgic mood. Absentees we greatly missed were Sam Berke, Bill Brackett, John Dalton, Jack Dalton, Ben Neal, Al Sampson, Jac Sindler, Boots Malone, Frank Murphy and Louie Young, Gene Eisenberg and David Hamburg. We missed them all. Present were Larry Bailey, Wayne Bradley, Whit Brown, Ray Delano, Herb Eisenberg, '52, Jim Hoey, '43, Reggie Foster and guest Harold Bartlett, Clive Lacy, Horatio Lamson, Larry Landers, Azel Mack, Archie Morrison, Harry Murphy, Charlie Norton, Stan Osborn, Wally Pike, Pirate and Gerry Rooney, Bill and Jack Shells, Bill Smith, Fred Waters, Pop Wood and Max Woythaler—a remarkable attendance and an excellent example of what this "Class Supreme" really means. For here we have practically half the attendance coming from long distances outside Metropolitan Boston, not to buy or sell anything, but just to be with the Class crowd. Let's keep it going! Larry Bailey and Ray Delano, Duxbury; Wayne Bradley, Moosup, Conn.; Harry Murphy, Hingham; Charlie Norton walked on the waters from Martha's Vineyard; Stan Osborn, Hartford, Conn.; Archie Morrison and Fred Waters, Marblehead; Pop Wood, Peterboro, N.H.; Max Woythaler, Framingham; Reggie Foster and his guest, Lowell. How are you going to hold them down? Our young members were as welcome as ever, and we hope they will always come. Particularly welcome was young Jack Shells who came for the first time with his brother Bill. Surely, that's a fine bunch with a friendly Class spirit. **Charlie Norton** stayed over with us, a welcome guest. We missed our new Honorary Member, Ralph Runels, who could not make it from Lowell.

In October all Boston was excited about the Red Sox and the World Series here. The Boston *Herald* had this piece, "Among the many notables to see the World Series in Boston this week was Rear Admiral **William H. Smith** (Ret.), a graduate of M.I.T., who was present at the first World Series game held in Boston in 1903." A modest guy, the mystery to Bill is who put this in the paper. The mystery to the rest of us is where did he get the ticket? I'm not crying "wolf" but, really, "help, help" you know.—**Azel W. Mack**, Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

16

"Do not park on both sides of the highway at the same time." This is the clear-cut wording of an official sign discovered by a sharp-eyed classmate back in May. And where do you think it was, and who do you think reported finding it? It was retired Navy Captain **Irving B. McDaniel**, and he found it in the Philippines on National Highway No. 25 from Manila to Cavite! Other travelers of special interest to us are three in a party of four, Sylvia and **Vert Young** plus **Art Shuey**, who had an extended freighter trip down the west coast of South America, an air flight across to Buenos Aires, and a freighter return up the east coast and home to New Orleans. Here is an interesting excerpt from Sylvia's "Fourth Young Safari Letters" as they stopped in Lima, Peru, and visited the Inca ruins: "We had an excellent guide, a well-educated, English-speaking gentleman named Carlos. He drove us through the city, pointing out places of beauty and interest, and then drove 35 miles to the Inca ruins. The drive was a beautiful one on a fine, broad well-made highway skirting the ocean most of the way. Breathtaking views of the coast with the swells rolling in and the 'dry mountains' in the distance . . . Inca, meaning king, is often confused as meaning the name of the tribe. The Incas were the kings of these Indians who built a very wonderful civilization, especially politically. They possessed gold in great abundance which the Spaniards coveted and finally stole from them. They ruled for only 200 years, but they were very remarkable years. Their girls never married until late in their 20th year for they had to attend school at the age of 21 where they learned the things that would make them good wives and mothers—how to sew, cook, administer punishment, heal the sick, care for the family's finances, and to set good examples for their children in behavior. It makes me very sorry to think that this development achieved so long ago among peoples, some 6,000,000 of them living under hardships and deprivations unknown to us, could advance so rapidly and achieve so much. They were destroyed by treachery of an illegitimate brother. . . . The ruins cover miles of mountain top from which one can see the ocean and down across the dry, dry lands. The ruins would long since have been gone if there had been even normal rainfall. Some of their buildings were six or eight stories high. One building has been restored which adds much to the imagination. It was spacious and attractive with arched doorways and windows, narrow at top and wide at bottom. Much more I could tell you, but I am too full of words to suit most readers. . . . Leaving the ruins we drove miles to the Chicken Farm, owned and operated by a tall, fine looking Swiss from Lucerne. The room where we were served looked out on the far mountains

and gardens and into other rooms crowded with Spanish visitors with lovely looking women, beautifully dressed. The handsome Swiss invited us to go after the luncheon up the mountains to the six houses he had built on the mountain for those able to pay \$400 to \$500 a week for a spot of paradise—swimming pool for each cottage, bedrooms for two couples, very modern small kitchen and tiled baths, a large living room with built-in bar equipped with liquor, windows from floor to ceiling looking out at the mountain sides and valleys. What a place for a vacation! Couldn't begin to give you the thrill this spot engendered! It would be worth the lovely voyage across the Gulf and Caribbean Sea and the Pacific Ocean just to land here near Lima, visit the ancient cultural city and ruins and live in such a glorious spot for even one weekend!"

We have scouts all over, and this is what we heard from **Kem Dean** in Houston, Texas, in mid-September: "A few days ago Ada and I were pleasantly surprised to get a telephone call from a close neighbor a block up the street saying that **Ralph Fletcher** was there and would welcome us for a drink and a visit. We were delighted to see him looking fit as a fiddle. He and a friend from Canada were going dove shooting with my neighbor down in the Rio Grande Valley and across the border into Mexico. I talked with Ralph again yesterday just as he was due to take off on his return to Massachusetts and was told they had a great shoot. This neighbor of ours has been shooting with Ralph several times before in Scotland, and I think maybe fishing with him in Canada. Raph said Sibyl was fine but could not come with him on this trip. Ada and I hope he will come again and bring Sibyl with him next time. . . . In September **Jap Carr** finished running his 10th annual Buck Hill Falls (Pa.) Tennis Tournament with 104 people coming from as far as Boston, Georgia points and Buffalo. Says it is his last one for he feels that 10 years is his quota. . . . **Walt Binger**, Class Historian, sent the beautiful oversized red leather folder of individual biographies that he prepared for the 50th Reunion to the libraries of M.I.T. and reports this nice acknowledgement from William N. Locke, Director of Libraries: "The volume of M.I.T. Class of 1916 50th anniversary biographies has arrived and has been deposited in the Institute Archives where it will provide for future generations a picture of the interests and activities of your Class. In the name of the Institute Libraries I send my thanks through you to the Class of 1916." Some time ago Walt made a gift of a tapestry, and this is what Mr. Locke refers to when he adds: "I see the 'Return of the Prodigal Son' daily since it is just outside the door to my office. It adds a great deal to the atmosphere of the Humanities Libraries." Something for each classmate to see on his or her next visit to Cambridge.

A short while back we had a note from Pearl Wilson together with a news clipping that mentioned a Professor **Blythe Stason** of William and Mary, and she asked whether our Blythe had given up his post at Vanderbilt University, a distinguished professorship in law. Off went the clipping to Blythe, and here is his reply: "Pearl Wilson's clipping involves not the old man, but my son Blythe, Jr. He is an Associate Professor of Law at William and Mary and is a better man than his father. . . . Back in July **Cy Guething** reported that the most pleasant day of their summer vacation in Boothbay Harbor "so far" was their visit to Wayne, 60 miles away, where they had lunch with Mildred and **Charlie Reed**. Says Cy: "They have a beautiful summer camp on one of those rare sandy beaches on the northern shore of Androscoggin Lake. The fog at Boothbay has been so heavy and the wind so light that there has been no sailing, but the fishing has been good. **Jimmie Evans** made sure my birthday would not pass without much fanfare as he arranged for a birthday cake and party of embarrassing proportions. Although our 51st has just passed, we are already looking forward to the 52nd, a year for each card in the deck." . . . **Duke Wellington** too, another dependable in responses, tells of much fog "down" in Maine: "Now that I am out of the fog, weatherwise, for that is all we had this summer in Maine, maybe I can come to and do a few things around our new place at Whaler's Point (East Haven, Conn.), such as plant bulbs for next spring. There are some members of the Class who have more grandchildren and 'greats' than I have, so will skip that. One is taking a P.G. for an M.A. at George Washington; another is a freshman at Lea College. Have not seen any classmates since the 50th, and my health is good for one of my age.

Here's more from Irv McDaniel on a letterhead from Kuala Lumpur, Malaysia: "Singapore, the city of sin. I guess that sin is the same all over the world, but all over the world there is only one Sin-gapore. This time we learned to love that city. On any street, at any time, what a melting-pot: multi-colored turbaned Sikhs, jewel peddlars from Nepal, the furtive look of the Bombay merchant, the happy faces of the Malays, the bespectacled Chinese and Japs, the Sukarno hats, the cotton Nehru

caps, the velvet Malay hat, mini dresses and mini morals, the Chinese cheongsam with its high collar and slit skirt. One night we had dinner on the roof of the Adelphi Hotel and saw their Lion City Revue, which is a must. Singapore is called the Lion City, and this is an evening of an exotic Malaysian night with its rhythms and melodies, its splendor and excitement. Colorful costumes, old dances and lyrics make their folklore live once again. All of their dances are entirely different and their costumes varied. They have an umbrella dance for flirting and a handkerchief dance for making love; they harvest rice and scoop out coconuts. But best of all is their bersanding or wedding ceremony where they are crowned King and Queen for a day. . . . Our next port-of-call was Lumut. Don't try to find it on any map. Very few ships ever stop here. See why we like freighters? It was Sunday, and the customs and immigration offices were closed. We finally found the officers but they had all their rubber stamps locked up so they couldn't stamp our passports. But they said go along, no one would bother us. No one did. Most of the passengers went for a swim at the Beach of Passionate Love. Kay and I considered it, but we had more urgent plans. We hired a car and drove at top speed for over three hours to Ipoh (cost \$8.00). The roads were excellent, and we passed mile after mile of rubber plantations. There was also rice, ginger and taro, magnificent schools, homes you would be content to live in, no slums or signs of poverty. Malaysia grows one third of the world's supply of natural rubber. Tin is their no. 2 product, and they mine 20 per cent of the world's supply. Ipoh is the center of their tin mining. Then an hour by train in a deluxe club car with buffet and bar. What a train, what comfort! And a two-hour drive up a mountain to the fine Cameron Highlands Hotel in the State of Pahang, one large game preserve. The big game included tigers, elephants, honey bears, leopards, rhinoceros, wild ox, barking deer, monkeys crocodiles and all kinds of snakes including cobras. This is the home of the orangutan which is a Malay word for forest man. On our way down we stopped at Mile Station No. 14. That is where all the natives have left because five tigers were killing their pigs, goats and sheep. From now on we were to see thousands and thousands of acres of palm oil trees. This is a new product and is the hottest thing on the market. The tree looks like a California date palm and from the kernels, the size of a large Brazil nut, they extract an oil which is used for margarine, soap, cooking oil and cosmetics. Next we went to the government Rest House at Tapah. There we met the Sultan of Selangor and his Consort Tengku Ampuan. What a retinue he had, uniforms, flags flying, but he had only four or five of his harem as he was just on an overnight trip. They were most gracious and we took their pictures. . . . We



Vertrees Young, '16, gathers specimens in Matarani, Peru, July 1967.

took the deluxe train to their capitol, Kuala Lumpur, where we stayed at another of the world's great hotels, Hotel Merlin. And I place their cafe, the Dragon Court, as no. 3 or no. 4 on my list of all-time eating places. K.L. is also one of the world's most beautiful capitols, and we were kept busy for three hectic days. Their national museum is a must. Be sure to visit their national mosque and the king's palace. And you have to see the Malaysian University to believe it. It is enormous and fantastic. Many Americans claim that in a few years it will have the best school of medicine in the world. I am ready to agree. Then we saw our swanky Peace Corps office. Is this a backward nation? From what I saw, there is plenty they could teach us!"

We regret to report the death of **Bob Crosby** on June 2, just before the reunion on Cape Cod. He was a retired research engineer of the United Shoe Machinery Corporation of Beverly and had been with them since 1929. He retired July 1, 1959. In June 1938 he organized and headed its Planning Department and was Chairman of the Steering Committee. During the war years starting in May 1942 he was Supervisor of the Defense Service Section. After the war he returned to Supervisor of the Planning Department. In 1947 he was made Department Manager of the Program Department, and this department was transferred to Boston in 1948 where he was made Chairman of the Program Committee. The group was brought back to Beverly in 1954 where he remained head until his retirement. Besides his wife Hazel, who has been a reunion regular for years, he leaves a daughter, Mrs. Richard (Cynthia) Wimer of Bar Harbor, Me., and three grandchildren. . . . And we also regret to report the death of **Fred Bryant** of Bronxville, N.Y., on June 21—kindly reported to us by Joseph Pope, '08, of Bronxville. Fred used to join us at some of the 1916 Class dinners and luncheons in the Tech Club of New York, and a 1955 dinner picture shows him sitting between **George Petit** and **Dave Patten**. As reported in his local paper: "Son of the late George Holmes Bryant and Annie Speare Bryant he was born in Palo Alto, Calif., September 1, 1892, and had resided in



Sylvia and Vertrees Young, '16, shown in their Bogalusa, La., home.

Bronxville since 1925. On June 12, 1920, he married Miss Mary Sheffield in Middletown, R.I. He was a retired broker and headed the firm of Bryant and Heffernan Freight Forwarding Company. A veteran of World Wars I and II he held the rank of major when he left military service. He is survived by his wife and a daughter, Elizabeth H. Bryant, of New York City." . . . We are indebted to **Arvin Page** for a clipping from the New Britain, Conn., *Herald* about the death of **Norman Vile** on August 31. It reads: "Norman J. Vile, 73, of Stonington, for many years a prominent industrial figure, died yesterday at Uncas-on-Thames Hospital, Norwich, after a long illness. Born in New Britain on April 24, 1894, Mr. Vile was a son of William A. and Bessie A. (Gridley) Vile. The family moved to Meriden when he was a child. He was graduated from the Massachusetts Institute of Technology in 1916 with a degree in mechanical engineering. During World War I he served with the Gas Defense Division of the U.S. Army. Mr. Vile worked for many years for the American Hardware Company, then for Corbin Screw Division and later was mechanical superintendent at Corbin Cabinet Lock. Before going to Terryville as vice president and chief engineer with Eagle Lock Company, he served as president of Special Devices in Kensington. In 1952 Mr. Vile went to Maryland, and in 1958 he retired and moved to Tavernia. He returned to Connecticut in 1965. Surviving are a son, Judd Mason Vile of Costa Mesa, Calif., a daughter, Mrs. James C. Messina of Mystic, and six grandchildren."

From **Paul Hatch** in Dover we have: "Not much news here. I'm still working. It seems that many years ago I formed a very expensive habit and find that if I don't work, I don't eat (at least the way I like to). So to satisfy that habit, I still plug along. . . . **Hovey Freeman** reports: "We have given up our Providence residence and are now living permanently at what was our summer home, Pop-pasquash Road, Bristol, R.I., which we like very much." He indicates he is coming along all right following an operation. . . . And **Nat Warshaw** too reports, good recovery from surgery in May and feeling "30 years younger at least." . . . **Arvin Page** of Winston-Salem is one of our good old reliables. We can always depend on an answer from him and usually something different. Those who know Arvin will know just how to take it when he writes something like this: "I regret I have nothing to report regarding myself, and your suggestions fall on barren ground, to wit: I have been doing nothing beyond trying to develop the width and thickness of my base of operations. At this I have attained considerable success. I have been nowhere recently and do not expect to travel in the future until I come to that last long mile. I have seen no one from our Class for over a year. I am too lazy to supply you with any philosophical observations from my vast store. Sorry I am of no more help; you deserve better than this." . . . In late September, **Francis Stern** wrote: "Sunday I had a very

interesting afternoon. ZBT, my fraternity, was installed at the University of Hartford as an official chapter. Who did the installation? The M.I.T. (Xi) Chapter! A fine bunch of boys; 22 in all were officially initiated." . . . **John Fairfield** mentions that his wife, Gladys, in reference to her mineral club activities, went to South America in July-August and brought back 800 slides which have now been sorted and filed. Then: "Garden doing very well, apples, grapes, plums, vegetables, sunflowers. Cheerio!" In New Jersey, less success, for our tomatoes were bothered by slugs. . . . **Maury Holland**, referencing our May item on stitchtite, tells us: "On my desk, as I write, is a purple with serpentine pattern 1½ inch oval of stitchtite from Africa mounted in a silver frame, and as I told Vert Young, a conversation piece, hand-crafted by an M.I.T. classmate. I was able to send him one of my hobby specialties, a rare 'conus regius' shell which is indigenous to Florida West Coast only." And we must add our appreciation of a gift sent by Maury to whom he calls "our dedicated Class reporter"—an attractive bolo tie with a Rhode Island maroon-colored Indian arrowhead.

We can't close without passing along a word from Vertrees and Sylvia Young in Bogalusa, La., where the Dodges had a wonderful visit at their Smoky Creek Plantation late in September. We have often heard of the over 150 million pine trees that Vertrees was responsible for planting in Louisiana during his 30 years there, retiring 10 years ago as President of Gaylord Container Corporation. But you have to see mile after mile after mile of these 70-or-more footers to sense the timber wealth that has been added to the state. And the enormous paper mill, the second largest in the U.S.A! Vertrees told us to bring our 50th red blazer, and at an evening party "we will knock their eyes out!" The walls of Vert's study and library are impressively populated with many animal-head trophies of their African safaris, and the beautifully dressed skin of the leopard that Sylvia herself shot, to the amazement of the native safari personnel. In two special buildings, with rocks and refined cutting and polishing equipment, can be seen how far Vertrees, the rock-hound, has gone in his hobby of collecting geological specimens, rack after rack and case displays of a comprehensive collection of beautiful rocks, gemstones and minerals. And Vert has this message, one that you should keep fresh in your mind. If anyone from '16 gets to New Orleans, or is driving in Southern Louisiana or Mississippi, Vert and Sylvia would be pleased to have a telephone call with a view to a possible visit to Bogalusa. And by the way, Vert still has on hand some beautiful specimens of stitchtite (purple with green serpentine) mentioned in our May column; if interested, call him or write him at P.O. Box 40, Bogalusa. . . . And so we come to the end of this month's news. We have letters from **Hy Ullian**, **Charlie Lawrance** and **Herb Gilkey** to be reported next time. Keep the letters and cards coming in.

Write a little but write often to help fill the column. And for the coming holiday season, your officers wish to offer their best wishes for a merry Christmas and a happy and healthful New Year.—**Harold F. Dodge**, Secretary, 96 Briarcliff Rd., Mountain Lakes, N.J. 07046; **Leonard Stone**, Assistant Secretary, 34-16 85th St., Jackson Heights, N.Y. 11372

17

As these notes are being edited **Stan Dunning** advises that work is proceeding for the *Reunion News* which is being covered separately rather than in the Class notes. This, when issued, will give our full Class '17 listing of 345 and 6 honorary members a resumé of our 50th Reunion. However, you have received **Al Lunn's** letter of September 6 which further bears on the 50th Reunion, also the enclosure covering the 1967-68 M.I.T. Alumni Fund. The fact that our Class participation in the '66-'67 Alumni Fund reached 64%, exceeded only by the Class of '05, is indeed outstanding, but let's make it better for the '67-'68. 50th Reunions like ours just don't happen. It is hard to estimate all the sweat that was expended, at least 1000 man hours and some 50 committee meetings all exclusive of **Ray Steven's** four and a half years of effort on the Class Gift Fund. Al Lunn writes, "Regarding the 70 letters received from classmates, this is the estimated total received by Stan Dunning, Tubby Strout, Loosh Hill, Ray Stevens and myself, many of these had no news but only asked about arrangements, etc." **Brick Dunham** sums it up very well, "Rather than dwelling on man-hours I would much rather put the emphasis on the good time and satisfaction which I derived from the whole affair. First I was amazed at the knowledge Al Lunn has of the members of the Class. I expect some of it comes from his years of service in the Alumni Association and from his travels around the country. Al carried on the meetings at a reasonable pace so that even I did not get lost. Stan Dunning really had quite a load with the publicity as many of the Class would mislay or lose the information sent them and so write or phone in to have it duplicated. Others would change their minds, and still others would put off answering until after the deadline and then expect all to be well. The blazer sales were also a load but were completed luckily after the Reunion when Stan found purchasers for two odd sizes. A decision to print 500 copies of the Reunion booklet worked out well. There are about 30 copies at the M.I.T. Alumni office which I am sure could be had for the asking." In conclusion Brick reports, "Edna and I are home again after two salmon fishing trips, one in the Gaspee and one in New Brunswick." Our appreciation is given for the best wishes for our 50th Reunion from the Class of '16 when their President Ralph Fletcher addressed us at the banquet at Chatham Bars Inn, and also the

technical assistance rendered by Harold Dodge their Secretary, also Azel Mack's, Secretary of Class of '15, letter received prior to the Reunion.

There are still some classmates actively supporting our economy, **Dud Bell** being one of our hard working members who advised that following the Reunion he with his private secretary, Helen, was leaving on a business trip to Albany and Rochester, N.Y. . . . Professor **R. S. Mulliken** advised that he could not be at the Reunion inasmuch as he was to be in England to receive an honorary degree from the University of Cambridge. The University of Chicago in its spring *Reports* magazine reads, "...received the 1966 Nobel Prize in Chemistry for his fundamental work concerning chemical bonds and the electronic structure of molecules by the molecular orbital method. For more than 40 years Mulliken has played a leading roll in the development of molecular orbital theory which describes the chemical forces, or bonds, which hold atoms together in molecules. This theory helps scientists to understand the behavior of known molecules and to predict the behavior of molecules that are still unknown. From the beginning much of Mulliken's research has been concerned with molecular spectra, which are complex patterns produced when molecules are absorbed or give off light. It was known that these patterns contain information about the arrangement of electrons in the molecules, but it was impossible to interpret them exactly until Mulliken applied quantum theory to the problem and developed interpretations in molecular orbital terms. In the 1950's he turned his attentions to the so-called molecular complexes, which are combinations of molecules held together by forces weaker than those within molecules. His interpretation of the spectra of molecular complexes by quantum theory led to new understanding of the structure of molecular complexes and new insight into the chemical reactions and biological systems in which they play an important role.

Mrs. Ham Wood requested the floor at the 50th Reunion banquet and commented, "Best cardinal birds ever seen." Of course she was referring to the Class of '17 in their cardinal and grey blazers! . . . The floor was also granted to Mrs. Marion Ford who expressed the ladies' appreciative thanks for the gold friendship circle pins with the embossed beavers which were distributed to all the attending ladies. . . . In addition to celebrating the 50th Reunion **Howie Melvin** and his wife also were celebrating at the time their 50th wedding anniversary. Also doubly celebrating were Rose and **Just Basch** who made it their 42nd. . . . On August 23 Dr. Bradley Dewey celebrated his 80th birthday. About 250 guests were present and it was a gala affair. The Killians, Strattons, and Howard Johnsons were there along with four from '17—Conchita Lobdell Pearson with husband, the **Penn Brooks**, **Johnny De Bell**, and the **Al Lunn**s. . . . We

were glad to hear from Anne Parker, **Dean Parker**'s widow, "Congratulations to all the steering crew on a well sailed 50th cruise. My many qualms up to and especially at the registry table when the girls were shuffling for Dean's card overcame me. It seemed to me the other widows were also feeling 'welcomed aboard', and were helped by you all who got me over another hump. I know Dean would have loved being there in the flesh. Thank you from his alternate for all you kept doing."

On June 1 at the Hotel Plaza in New York the M.I.T. Alumni Center of New York had their annual meeting, a fellows dinner and dance honoring Dr. Stratton with the Silver Stein Award. Attending were some 200 alumni and wives including Conchita Lobdell and the Proctors representing '17. We have an announcement appearing in the *Globe & Mail* of Toronto, Ontario, Canada, dated June 29 reading: "Mrs. Harold E. Lobdell of Mexico City and Harold C. Pearson of Toronto announce their marriage on June 26, 1967, in the Church of St. Francis in Staunton, Va. Following the marriage ceremony the bridal party was entertained at Buxton Farm, the Virginia home of Mr. and Mrs. Pennell Brooks of Boston. Mrs. Lobdell was the widow of the late Dean Lobdell of the Massachusetts Institute of Technology. Mr. Pearson is President of Canadian Consociates, Ltd. Mr. and Mrs. Pearson expect to divide their time between Mexico City and Toronto." Conchita comments further, "As he is an M.I.T. '23, it will keep me close to my friends. It was a wonderful 50th Reunion to be remembered for a long time. I will continue to be the same Conchita; hope all my friends at M.I.T. will feel the same." . . . Al Lunn talked with **Rad Stevens** at Elgin, Ill. Rad missed the Reunion because of a double hernia operation, but he is feeling fine and is back full time at Doughboy Industries. His reunion booklet arrived, which he thinks is fine. His blazer also arrived and is a good fit. He liked it so much he wore it to a cocktail party the day after arrival.

We have extended our most deeply felt sympathy to Steve Brophy's family on his sudden passing on July 29, and also to the Class of '16. We have acknowledgement from Mrs. Jessie Brophy, "The kind sympathy of you and the Class of '17 was deeply appreciated. As you know M.I.T. was very close to Steve's heart, and it is comforting to know that his friends and associates from there are mourning his loss with us." From Harold Dodge, Secretary of the Class of '16, "Thank you for your letter of the 12th relative Steve Brophy, have noted sympathy of the Class of '17. Yes, the attendance at Steve's services was impressive." The services at St. Ignatius Loyola Church 84th and Park Ave., N.Y.C., was attended by Penn Brooks, Dr. Killian and President Johnson among the honorary pall bearers. Paired with Penn in the procession was Steve's neighbor, Lowell Thomas, Sr. Also attending the services were Don Sev-

erance and Joseph Snyder, Treasurer of the Institute.

In September the regular monthly luncheons at the Chemists Club in New York City were resumed, and again it is a '16-'17 group. Instead of the Thursdays it is now Tuesdays after the first Monday of each month, September through June. This change to Tuesday was primarily to join '16. Only one blazer appeared, but **Bill Hunter** is getting his pressed for the next luncheon. Don Severance comments, "I would not have been without that blazer on Alumni Day for all the tea in China; and you may count on my wearing it next June and the Junes after that, etc." At the September luncheon '16 outnumbered us 2-1 and at the October one they were one up on us. . . . Word has been received that the 20th Annual M.I.T. Fiesta in Mexico will be held March 14 through 16. For further information write M.I.T. Club of Mexico City, Reforma 116-804, Mexico 6, D. F. Mexico. . . . Shades of **Win McNeill**, some of you no doubt read the bit about Somerset Maugham in a recent issue of *Readers Digest*; it is so pat to the present situation that I must repeat it. "Mr. Maugham was making a speech before a distinguished audience on his 80th birthday recounting the pleasures and privileges of age. When he said, 'Old age brings with it great and unique advantages,' he fell silent. The silence stretched on and on until finally the toastmaster, thinking him asleep, nudged him. 'I am sorry,' said Mr. Maugham, 'for this delay, but I have been trying to think what they are.' " . . . So with the above thought I will close the notes for '67 wishing you one and all the best of holidays and a healthy and happy New Year.—**C. Dix Proctor**, Secretary, PO Box 336, Lincoln



John A. Lunn, '17, received two Bronze Beavers from Gregory Smith, '30, President of the 1967 Alumni Officers' Conference in San Francisco—one for himself and one for the Class of 1917. The citation said that the Class of 1917 "has emerged as a bulwark of strength for M.I.T. . . . To salute the Class of 1917 is to recognize the essential role that alumni, individually and in concert, play in furthering the well-being of M.I.T." Mr. Lunn's own citation said that "in his chairmanship of the Association's first Long Range Planning Committee, as in all his contributions on behalf of M.I.T. and our community, he has demonstrated the leadership and dedication which inspire his associates and reflect credit on the Institute."

18

There is something special about college classmates. Like good health, they take their friendships for granted until they don't have them any more. Well, we have a 50th Reunion coming up June 7 to 10, 1968. By sheer coincidence on June 7, 1967, we Magouns had a foretaste of the moments of vigor and commanding merit which reunions produce. **John Kilduff** and **Tom Kelly** dropped in for some relaxed moments filled with bubbles of reminiscence. It all began with a note from John (Box 33, Amesbury, Mass.) headed, "The Red Coats are coming. In the days of Paul Revere this was a startling announcement," he continues. "Today it simply means glad tidings, for it heralds the fact that our 50th is approaching and we traditionally wear red coats. These are actually good, wearable jackets, and are usually supplied by special donations from those classmates who feel able to help all of us become fittingly resplendent for the occasion. The Class of 1916, our sponsors when we were freshmen, called to tender their assistance in the procurement of said red coats, should that prove necessary. This parallels our own **Malcolm Baber's** suggestion (1717 Sansom St., Phila. 3) that those of us who can, chip in for a 50th expense fund. The red coats are coming!" Then on May 7 John shared the news that **Carleton Blanchard** (157 Church St., New Haven 7) had made a substantial contribution to our 50th Gift Fund for M.I.T. "Such action is typical of Carl and gives encouragement to those of us who endeavor to get that campaign going. He has contributed a lot to our reunion activities with his music. We owe him a great deal for his consistent support." **Ned Longley** (29 Fox Chase Road East, Woodland Hills, Asheville, N.C.) wants to know how our 50th Reunion Fund is coming and how much has been subscribed to date. I'd like to know, but don't. On June 7 Johnny and Tom appeared, and what a time we had, going all the way back to the fact that Herr Meister ("Sind da Fragen?") disappeared the day after war was declared in 1917 and was not heard from thereafter. I showed Tom the paint oil finish inside my log cabin, which is of his manufacture and as good as the day it was put on in 1938. Later, John sent Carolyn a set of stainless steel bowls of his manufacture, which, as he wrote are "as durable as our friendship over these many years." Tom Kelly, (144 Lawrence St., Gardner, Mass. 01440) also testified to the magic touch of that day together. "Yesterday was one of the nicest days I have spent for a long time. Your interesting home on the shore of Thordike Pond is the ideal spot for ease from the tensions of everyday life.

Carolyn is a hostess par excellence, and everything was as perfect as a gracious hostess and host could make it. When I finally looked at my watch and discovered it was five o'clock, I didn't know where the time had gone. The reminiscences, discussions, and the numerous topics we touched upon, and the pleasant company, made the afternoon flit away on golden wings. You have so many interesting things on your place that they could be the subject of a novel. The log cabin, which I suppose I could call Alexander's Hideaway, is a monument to your training in mechanical and electrical engineering at M.I.T. I don't wonder that a good deal of your writing is done there where there are no distractions. There are many other things, including the appreciations of your human relations work from so many manufacturers. It must be a source of satisfaction to you. It was altogether a most enjoyable day for John and me. We are looking forward to your visit with us in Gardner."

Professor Herbert Gilkey, '16, Emeritus of Iowa State University, wrote to Harold Dodge, my opposite number for 1916, who shared the letter with me. "Although I do considerable browsing in the areas of newspapers and technical literature, only rarely do I read a book. Recently I did, a 350-page affair. The achievement was rare enough to be newsworthy, but as a reportable item it would normally be of no conceivable interest to anyone, not even a wife or a classmate. But wait, the book in question was: *When M.I.T. was Boston Tech 1861-1961*, by Samuel C. Prescott, '94. It should have been made required reading as a prelude to the 1966 Reunion. I promise that fellow delinquents will find that the recital of the facts as we lived them, and the renewal with the professors as we knew them, will out-fascinate a paperback western." . . . We met **Harold Weber** (Mason, N.H.) at the New Hampshire Philharmonic Orchestra concert in Peterborough. He said he and his wife are going to Europe in September. He is much too busy for a man his age, but there's hope of a word from him when he gets home. He told me about someone asking, "Who was that old man you were talking with," meaning me, to which he replied, "Oh, he's a former student of mine." . . . While walking across the campus at Franklin Pierce College the other day, and realizing we approach our second childhood, I tried to bring a few nursery rhymes up to date. The first try is as follows: "Mary had a mini skirt, / It was too short by half, / Who gives a damn for Mary's lamb / When you can see her calf?"

Through the courtesy of James Evans comes word concerning the death of his brother, **Alfred R. Evans** (137 Crystal Beach Ave., Dunedin, Fla.) in September. After studying business administration at M.I.T. he attended Fordham Law School before becoming

Assistant Director of Purchasing for the U.S. Shipping Board in Philadelphia during World War I. He organized and was President of the Home Insulation Company of New Haven, and retired to Florida in 1960. . . . **Arthur Marsh** (364 Weston Road, Wellesley 02181) died on May 26. . . . **Walter Engelbrecht** (Burlingame Hotel, Bartlesville, Okla. 74003) followed August 27. There is something special about college classmates, but they are not immortal.—**F. Alexander Magoun**, Secretary, Jaffrey, N.H. 03452

19

The Class of '19 is having a dinner in New York City at the Roger Smith Hotel on October 17. In addition to answers concerning attendance at the dinner, I have a few gleanings of news: **Marshall Balfour** is spending the month of October in Rome as a Population Consultant to the Ford and Agricultural organizations. . . . **Paul Blye** is making his annual fall tour of Vermont and New Hampshire shortly. He bumped into **Al Reynolds** who he says is looking fine. . . . Our sympathy to **Jim Strobbridge** who lost his wife last December. He is still doing volunteer work at two museums. . . . **Cut Davis** writes from Buffalo that he is confined to a wheelchair, but he is very active at the bridge table. His wife passed away last October, but his sister is living with him and taking wonderful care of him. . . . **Izzy Paterson** spent six weeks in Europe this summer. For two weeks he was on International Electrotechnical Commission business in Prague, and then for four weeks on pleasure—Berlin, Vienna, Budapest, Yugoslavia, Zurich. . . . **Ben Bristol** says he is still at the same old stand, doing a little fishing and golf. . . . **Otto Muller** is retiring as President & Treasurer of Halsey, McCormack & Helmer, Inc., Bank Architects. He will continue as a consultant. He was in Scandinavia this summer. . . . **George Wiswall** says he has been up in Vermont for three years with all the cows. . . . Brentano's had a reception in honor of **Albert Mayer** on September 28 to celebrate the publication of his new book *The Urgent Future*.

Leighton Smith was in Utah in the late spring for a session of bird photography. He wrote: "Our hobby not only serves as the excuse for most of our trips, but also keeps us busy in other ways, such as putting on slide shows for camera clubs, bird clubs and other organizations. And for nearly three years I have been entering my slides in International Nature Salon competition. Am working for my 4 star rating as a nature exhibitor now." . . . **Blake Darling** wrote to **Doc Flynn** from his ranch in Empire City, Nev. After 27 years with fire insurance companies, Blake started in ranching. Due to osteoarthritis in his hips, he has been on crutches for over 11 years, but he has a fine man to run the ranch for

him. His son also has a large ranch near Elko, Nev. Doc Flynn is moving this month to Palmerton, Pa. He and his wife have purchased a place in the country between Palmerton and Stroudsburg, high with beautiful views. He expects to swim and fish, and his wife enjoys gardening. They also have an apartment right in Palmerton for the winter months. His new address is 209 Harvard Ave., Palmerton Pa. 18071. . . .

Alexis R. Wiren has moved to Spain. His address is Sol-y-Paz, Fornalutx, Mallorca, Spain. . . . We also report the following deaths: **Harold W. McIntosh**, Vineyard Haven, Mass., January 31, 1967; **Merritt P. Smith**, Silver Spring Md., May 6, 1967; **Arthur F. Kaupe**, Chicago, Ill.; and **Hyman G. Spector**, Brookline, Mass., July 9, 1967—**Eugene R. Smoley**, Secretary, 30 School Lane, Scarsdale, N.Y. 10583, and 1111 Casuarina Rd., Delray Beach, Fla. 33444, from January 1 to April 1, 1968

20

Our illustrious classmate **George Morgan** and Mrs. Morgan attended the Alumni Officers Conference in San Francisco. We had a grand visit, and it is a pleasure to report that George hasn't changed a bit either in looks or buoyancy of spirit. What a great guy! We expect the Morgans will be on hand for the 50th, and their presence will contribute greatly thereto. . . .

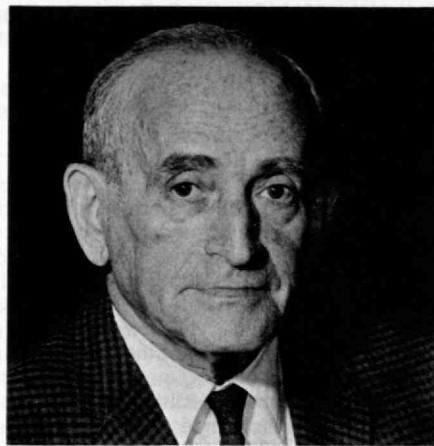
Mary Almy, who was a distinguished graduate of our School of Architecture, died recently in Boston. She was long associated with the firm of Howe, Manning and Almy, engaged in residential building in Cambridge, Cape Cod and other parts of New England. She was a member of the A.I.A., a director of the Cambridge Chapter, American Red Cross, a member of the Cambridge Adult Education Center, an auxiliary of Mt. Auburn Hospital and a charter member of the Mosquito Yacht Club in Cotuit. . . . In the next issue I hope to report on a meeting of the 50th Reunion Committee, now that we are at the halfway point between the happy and successful 45th and the reunion that promises to be the finest of them all.—**Harold Bugbee**, 21 Everell Road, Winchester, Mass. 01890

21

It is with sincere congratulations to the recipient that we record the honor accorded to **William J. Sherry** by the Alumni Association of M.I.T. which presented him with the 1967 Bronze Beaver Award on September 29 at the San Francisco National Alumni Officers Conference. Bill, a Vice President of the Alumni Association, a member of the important Development Committee of the M.I.T. Corporation and a former alumni term member of the Corporation itself, has long been an Honorary Secretary of the Institute and has affectionately been known in his home state as "Mr. M.I.T.

of Oklahoma." Bill's citation reads: "In grateful recognition of distinguished service to the M.I.T. Alumni Association, the 1967 Bronze Beaver is awarded to William James Sherry, '21. For decades he has served M.I.T. unselfishly as Honorary Secretary, the acknowledged leader for M.I.T. throughout his state, and as an officer of the Association and a term member of the Corporation. Alumni throughout the country admire his loyalty and effectiveness and value his friendship." Bill attended Notre Dame University before graduating with us and he has been Vice President of the Notre Dame Alumni Association. He has been a leader in Oklahoma, Tulsa and petroleum industry organizations as well as an outstanding Catholic layman in educational, social and religious orders. He has always been active in the affairs of the Class of '21. We extend to him, to Margaret and to the members of his fine family the congratulations and good wishes of everyone in the Class. You may wish to address a personal note to him at 1801 First National Building, Tulsa, Okla. 74103. In the absence of records and statistics which may show otherwise, we shall claim for the Class of '21 the largest number of Bronze Beaver recipients, including one dating back to 1955, the first year such awards were made. Besides Bill, the others from '21 are **Joe Wenick**, **Sam Lunden** and **Cac Clarke**. **Ed Farrand**, Sam Lunden and Bill were the members of our Class who attended the San Francisco sessions, which Ed terms an invigorating and inspiring experience. It was Ed who excitedly telephoned us immediately after the award had been made. We are grateful to him and particularly glad to hear that he and Helen are happy and well and enjoying their new home at 5981 La Jolla Mesa Dr., La Jolla, Calif. 92037.

When Maxine and your Secretary returned from a trip to Expo 67 in Montreal, we found a note saying that Graciela and **Helier Rodriguez** were in New York City and had been unable to reach us by phone. We hastened to join them for lunch and a most enjoyable afternoon just before they left for Washington to visit one of Graciela's sisters and to see Helen and **Bob Miller**. They had flown from their home in Spain to see the fair in Montreal after having had dinner with Bertha and **Bob Cook** in Madrid. The Cooks were on a chauffeured tour of Spain, France and Italy, from which they will return to their winter home at 633 Royal Plaza, Ft. Lauderdale, Fla. 33301. Graciela and Helier went from Washington to Tampa for about a month of visiting with members of their family, to be followed by a few weeks in Puerto Rico before flying home in November. They look excellent and seem to feel more inclined to do a greater amount of traveling in the future than their previous limited trip this year to Italy to hear the opera at LaScala. Helier is interested in cor-



Albert Wechsler, '21, retired as President of Converse Rubber Company, Malden, Mass., October 1, 1967. He will continue as a director and consultant.

responding with someone versed in the processing of gypsum, plaster or lime in connection with an interesting new development. Do you know anyone? . . . At the picnic which opened the new season for the M.I.T. Club of Northern New Jersey, Dorothy and **Joe Wenick** told us of the invitation extended to Joe by the Small Business Administration, Washington, to spend a month in Fairbanks, Alaska, in connection with making appraisals for checking and approving applications for loans to rebuild homes, industries and churches damaged by the recent floods. Joe will have just returned to his home, 37 Cedars Rd., Caldwell, N.J. 07006, as these words reach you. . . . Further to our note last month about **Sumner Hayward**, he has been released from the hospital after surgery and is recuperating rapidly. Betty reports visits by Joe Wenick, numerous phone calls by members of the Class of '21 from Maine to California and a host of cards and letters to Sumner at 224 Richards Rd., Ridgewood, N.J. 07450. . . . **Richmond S. Clark** had been in the hospital in July and found it necessary to return early in September, according to a letter **Irv Jakobson** received from Mary Louise Clark. She now writes in response to our letter that Rich has been sent home after a four-week sojourn with strict orders for rest and limited activities. You can reach Rich via P.O. Box 3807, Baytown, Texas 77520.

Professor **Preston W. Smith** writes: "I retired from teaching mathematics at St. Lawrence University in the summer of 1966. My wife and I are living with our son in Illinois at Scott Air Force Base, except during the summer when we are at our cottage at 20 Cliff St., N. Weymouth, Mass. 02191. **Oscar Kenneth Bates** retired last summer after 34 years as head of the department of mathematics at St. Lawrence." . . . Alex and **Munnie Hawes**, our neighbors in Sea Girt, N.J., are receiving congratulations on the arrival of their 8th grandchild, Alexandra Aimee, born in September to daughter Sandra Fredericks of Roseland, N.J. . . . **Eugene**

A. Hardin, an associate of Parsons, Brinckerhoff, Quade and Douglas, writes that he is now located in their offices at 25 Maiden Lane, San Francisco, Calif. 94108. . . . Once more the Alumni Register Office has screened our Class roster for names of those who have not been heard from for many years and whose mail has been consistently returned without offering a possibility for readily tracing to a new address. Under these circumstances the four men listed below with their courses and last known addresses are now assumed to be deceased and their names have been removed from the file. If you have any source of information regarding these classmates or know of any channel through which they may be reached, if living, please advise your Secretary: Dr. James Van Wagner Boyd, Course VII, 255 Union St., Springfield, Mass. 01105; Charles Barber Dicks, Jr., X, Industrial Chemistry Department, Tulane University, P.O. Box 567, New Orleans, La.; James Ford, XIII, Ford Builders, 213 Calle Miramar, Redondo Beach, Calif. 90277; Nicholas Ottens, I, American Foreign Association, United India Building, Sir Phirozshah Mehta Rd., Bombay 1, India.

Clark Doane Greene has sent a most welcome letter from his new mail address, Route 1, Box 179, Rock Hall, Md. 21661. Doane says: "I saw your note in the *Review* about my change in address. Your guess is correct. I have not moved. The post office is just getting a little fussy with their modernization program. Instead of 'engineer turned farmer,' as you remark, it would be more accurate to say 'engineer turned sailor.' About 60 years ago (horrible thought!) my father used to rig sails on various kinds of rowboats. He made the sails himself and just about wore out my mother's sewing machine. If one of his rigs got up enough speed to 'come about' without the help of an oar or paddle, that was great success. It was lots of fun to sail downwind, and we usually rowed back. In 1913 a cousin, M.I.T. '14, bought a *Manchester 17* which was 25' on deck, 17' at waterline, with a 1,000-pound lead keel, a cabin and two so-called bunks. To us this boat was nothing short of a miracle. It sailed to windward faster than downwind. It came about so fast you could pitch a man off the bow deck. So 50 years later and in anticipation of retirement, I bought a *Rainbow*, 24' on deck, 17' waterline, 1,100-pound cast iron keel, cabin and two bunks. Now, how have they improved sailboats in all these 50 years? Well, there's fiberglass construction, aluminum spars, Marconi rig, dacron sails and rope and stainless steel rigging. While these are all very great improvements which all but eliminate maintenance problems, I can't see that there is any notable improvement in performance, that is, in speed and ease of handling. Maybe this is just a tribute to the old *Manchester 17*. My boat is equipped for cruising with most of the comforts of home. A friend

owns a *Rainbow* equipped for racing, and he is good at it. Three times last year we sailed both boats to Annapolis, slept in mine and raced his. In our first three races we won two and got a second. The longest race was 13 or 14 miles—we finished over a mile ahead of the No. 2 boat. Probably the most fun is sailing in a gale. I have a storm main made of extra heavy canvas that is built to take it. Many people don't know that a well designed keel boat is fun in a high wind. All that is necessary is to reduce sail area in proportion to the square of the wind velocity. If, for example, your full sail area is 200 square feet and your boat performs satisfactorily in a 20 mile-an-hour wind, use 50 square feet of sail in a 40 mile-an-hour wind. This letter is getting too long. Maybe by this time you have guessed it; it's raining outside!"

Our local papers recently carried a picture of **S. Paul Johnston**, Director of the Air and Space Museum of the Smithsonian Institution, accepting an oil painting of the Tiros weather satellite from a representative of Minnesota Mining and Manufacturing Company. . . . Speaking of the 3M Company, we acknowledge receipt of a delightful letter from **Ivan C. Lawrence** who retired in 1954 as Vice President of Personnel Administration of that firm. Ike and Margaret now make their home at 2 Twin Shores Blvd., Longboat Key, Sarasota, Fla. 33577. He writes: "Margie and I have just returned from a three-month trip to Hawaii and the Orient to celebrate our 45th anniversary. Our first took place aboard ship enroute to join the Third Engineers at Schofield Barracks, Hawaii. Five years ago we also returned to Hawaii to celebrate our 40th. Growth in Hawaii is little short of amazing, from the time when the only hotels on Waikiki were the Moana and Halekulani. Now it is a veritable jungle of concrete with high rise hotels and apartments going up everywhere. We still enjoy the informal atmosphere, the fine hotels, shops and restaurants and watching the surfriders, outriggers and bikini-clad sunbathers and swimmers. The outer islands are also experiencing their share of growth, but there are still many beautiful places for all to enjoy where civilization has touched but lightly. We found Japan a fascinating blending of the old and new with its ancient temples and shrines and remarkable progress in transportation, electronics and optics. Hong Kong is indeed a shoppers' paradise, and its harbor is one of the most beautiful in the world both by day and night. Manila still shows scars of the war, but it is rapidly rising from its ruins with new construction very much in evidence. I am regretful that we were unable to attend the 45th Reunion. I did enjoy very much the fine description of the '21 reunion in Mexico." Ike was the commander of the Third Engineers and remained in service until 1926 when he went to Los Angeles in industrial en-

gineering and as manager of design for a construction firm. He joined 3M in 1933. He is a former president of the St. Paul Employers Association, the St. Paul Committee on Industrial Relations and the Twin City Chapter of the Society for Advancement of Management. He is a member of the Longboat Key Golf Club and follows his retirement activities of photography, travel and numerous hobbies. The Lawrences have three married daughters and 10 grandchildren.

Melvin R. Jenney, partner in the law firm of Kenway, Jenney & Hildreth, 24 School St., Boston, Mass. 02108, writes to pose an interesting observation: "A partner of mine who happens to be a Yale alumnus showed me the enclosed copy of a letter to the editor of the *Yale Alumni Magazine* of July, 1967, entitled 'Plumbing the Negro Situation.' I note that it is signed 'Ralph Shaw, Jr., '19, Beverly, N.J.' I wonder if this is our classmate Rufe Shaw, especially as the letter reads just the way Rufe sounds. I see that Beverly, N.J., is a suburb of Philadelphia, which indicates it might be our Rufe. However, I didn't know he was a Yale alumnus. So out of curiosity, could he be the author of the letter? I haven't heard from you since our trip to Mexico, which was one of the most delightful occasions we ever experienced." Yes, the article was written by our **Ralph Martin Shaw, Jr., A.B., Yale '19**, and VI-A, S.B., S.M., M.I.T. '21, the squire of Shawnee Hall on the Delaware, 608 Riverbank, Beverly, N.J. 08010. You are right that the letter has the filip and flourishes which only Rufe could bring to bear on the subject. We find ourselves totally incapable of effecting a resumé to do it justice and you, dear reader, will have to consult the original! We agree with your views on our excellent '21 reunion in Mexico, Mel; how about trying it again in 1969 when the Olympics are over?

Maxine and your Secretary had a delightful week in our adopted old "home town" of Montreal on a trip to Expo 67 with fellow Life Members of the Asbury Park Council, Telephone Pioneers of America. The fair is ideally located, beautifully built and provided with excellent transportation. Justifiably, attendance passed the 40 million mark while we were there. We managed to see a great deal of Expo, including the most popular buildings such as the Czechoslovakia, Telephone, Labyrinth, U.S., Canada and Art exhibits and delightedly rode the minirail at every opportunity. Good weather all week favored sightseeing and shopping in Montreal and noting the tremendous changes which have taken place since we lived there. Our highlight of the trip was a splendid dinner and evening with Muriel and **Eric Smith** who, with Anne and **Wally Adams**, Emma and **Al Lloyd** and ourselves, had enjoyed being together at the Hotel Alameda in Mexico City during the '21 reunion last March. Also guests at the dinner were

Mr. and Mrs. A. D. Ross ('22) who live near the Smiths. Eric showed his gorgeous pictures of the Mexico trip. Our New Jersey group was invited to tour Bell of Canada's Montreal headquarters and have luncheon with Telephone Pioneers from that organization and from the manufacturing affiliate, Northern Electric Company Ltd., with which we had been associated in the 20's. Meeting former associates was heightened by a dinner invitation for us from a close friend in Northern's Engineering Department, now also retired. On the eve of our departure dinner in the Altitude 737 restaurant atop 64-story Ville Marie provided good food and a superb night view of Expo and Montreal. Curiously, we had run into Dave and Mrs. Shepard ('26) coming out of the Telephone Pavilion and recalled a similar chance meeting with them at the last New York World's Fair. . . . Anne and Wally Adams returned to Expo the week after we were there, saw Muriel and Eric Smith again and then went to Nova Scotia and Prince Edward Island before returning to their home in Ohio via a grand stay with us here in Brielle. We toured the New Jersey coast area one day and had dinner together with Alex and Munnie Hawes. Another day we took steel expert Wally over to the Historic Howell Works at the Deserted Village at Allaire to see the bog iron blast furnace and the enameling oven, circa 1800. When we phoned, Betty told us Sumner Hayward was on his first trip out of the house having a haircut, but we finally got to speak to him and it was good to know he is getting along so well.

We have just talked to Maida and **Ed Dubé** via recording tape to thank them for their great help in advising us regarding the Expo trip and to plan for their proposed visit to Brielle in early November. Both Ed Dubé and Ed Farrand, our Class Agents, are to be highly complimented on the 1967 Amity Fund Report, enclosed with Class President **Ray St. Laurent's** letter to everyone. You will note that **Bill Sherry** was a member of the Fund Board for this record-breaking year when more than 17,000 alumni gave over \$2½ million to M.I.T. One gift took the form of a memorial to the late **C. Arthur Newton**. The Class of '21, 28th in size of the 61 class groups listed, gave the 6th largest dollar amount—a tribute to the generosity of each of the readers of this column and a mark of their appreciation for the tremendous job which Technology is doing on an exceedingly broad base of activities. Thanks to you, dear classmate, for your substantial help! Singled out for '21 honors in the year's results are Boston Class Chairman **Harry A. Goodman** and New York Class Chairman **Sumner Hayward**, both of whom went well over 100% of their quota of expected giving to this year's Fund. . . . Ray's letter to you raised the question of when you'd like to go to Mexico again, and we'd be interested in your

reaction. Also, we wish you would return to your Secretary the completed personal data form mailed to you in 1966 or ask us to supply another blank if you did not send in the first one so we can list you properly in the forthcoming '21 Class Directory. All of your Class officers and committeemen join in wishing for you and your dear ones most cordial season's greetings as well as for your health, happiness and prosperity throughout the coming year. News of your business or retirement activities, your travels and your family will be welcomed additions when enclosed with your holiday greetings to your Secretaries.—**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, N.J.; **Edwin T. Steffian**, Assistant Secretary, c/o Edwin T. Steffian and Associates, 19 Temple Place, Boston, Mass. 02111

22

On this chilly, gloomy day (a most unusual occurrence for Buffalo in October) your Secretary should not even be asked to write cheery, newsy and thrilling Class notes for the December issue. But Christmas greetings are proper only once a year; and this is the time. From all of us to all of you the world over a merry and joyous Christmas. . . . We can also report a news-worthy letter from our President, **Parke Appel**, and Madeline telling of their prospective September/October trip to Germany and of Operation Volkswagen through the romantic roads to Rothenberg and Nuremberg. Then through Switzerland including Zurich, Lucerne and Berne and back to Salzburg through the loop to Vienna and back to Munich. He asked for and promptly received advice on hotels and lodges. Parke also told of entertaining Katie and **Dale Spoor** on their way back to Richmond from Expo 67 and the September Seminar at M.I.T. Late in August Parke and **Don Carpenter** cruised along the South Shore and through the Cape Cod Canal in Don's new boat *Little Dipper II*. His report included all the comforts and conveniences of the 42-foot twin diesel craft. . . . We have been notified that the lounge in the new boathouse is being named to honor **Horace McCurdy**, certainly a most deserved tribute. Horace has been active in this field for many years and has been of constant service to the Institute in plans for its future. Your Secretary sent Mac a postcard from Kodiak during his Alaska inspection trip in August finding that Mac had not only built the Kodiak Base but also all other Naval Air Bases in Alaska extending from Sitka to Attu. . . . A welcome mat has been extended to the Class by **Erb N. Ditton** at Sunderland, Mass. 01375, near Amherst. He will provide drinks and reminiscences.

An article in the May issue of *Fortune* concerning participative management pictured **Fritz J. Roelthlisberger** now of the Harvard Business School as the Dean

of the "human relations approach to management theory." He was among the first to propose the "social importance of the workplace" as he originally disclosed the potential of the "small group" in industrial experiments 40 years ago and is now a distinguished herald among management theorists. . . . We have received word from **F. Reed Dallye** that he has retired from Alcoa in Pittsburgh and moved to San Diego County. . . . Also a note from **Paul C. Merrill** of San Marino, Calif., regretting his inability to attend the 45th in June. . . . **Theodore P. Shilkoff** has written from Alabama asking for references to M.I.T. Clubs in Birmingham or Huntsville. . . . A clipping dated Nantucket announces the appointment of **C. Herbert Taylor**, former Superintendent of Schools in Cranston, R. I., as Superintendent of the Nantucket Public School System. Mr. Taylor was selected from several candidates during the executive session of the Committee.

Your Secretary attended the Alumni Officers' Conference in San Francisco September 29 and 30. He can report that **Abbott Johnson** and **Dale Spoor** were there and joined **Tommy Thomson** in making this a successful '22 get-together. By accident **Bill Mueser** and his family were in San Francisco and met us at the entrance to the Palace Hotel at lunch time. Bill was happy to join the Conference while Edna was baby-sitting. It was a happy and constructive 24-hour meeting ending with a congenial bus trip to Muir Woods and Sausalito on Saturday afternoon. President Howard Johnson told us of the brightest freshman class ever with 85 per cent from the top 10 per cent of their respective schools. He told us of the new courses in ocean engineering, metallurgy and food science as well as the new buildings being built or planned. He also reviewed the new look at long-term goals emphasizing the quality of environment as well as the processes of teaching and learning. Others followed with general information and recommendations of the Long Range Planning Committee. We also had conferences on the Educational Council, the Alumni Fund and Clubs and presentations of new areas of research and teaching. Don Severance and the Alumni staff combined to make this Conference a great success.

During the Memorial Services at M.I.T. on Alumni Day, 28 names were included from the Class of '22. Among the most recent was that of **Keble B. Perine** from Mt. Clair, N. J., and later from Sunsites, Ariz. The sympathy of our Class is also extended to the families of **Julian E. Brach** of Philadelphia and **Harold L. Humes** of Princeton, N. J. Among the new addresses received are those of: **Rollin S. Baldwin**, Reston, Va. 22070; **Ralph C. Geckler**, Boca Raton, Fla. 33432; **Howard F. Baldwin**, Baltimore, Md. 21204; **Francis E. Slayter**, Walnut Creek, Calif. 94529; **Lawrence M. Gentleman**, New London, N. H. 03257; **William J. Edmonds**, Scarsdale, N. Y. 10583; **Roland H. Becker**, St. Petersburg,

Fla. 33704; **Edward A. Merrill**, San Francisco, Calif. 94108; **Mortimer Gibbons**, Rahway, N. J. 07065; **Francis J. Laverty**, New City, N.Y. 10956; **Joel D. Harvey**, South Duxbury, Mass. 02374; **Samuel H. Conrad**, Alexandria, Va. 22302; **Charles H. Whittum**, Rock Hall, Md. 21661; **Richard J. Sholtz**, Las Vegas, Nev. 89109. . . . We have fewer and fewer football and ski injuries to report and more and more moves toward the sunny South or West. Good luck and good health to you!—**Whitworth Ferguson**, Secretary, 333 Ellicott Street, Buffalo, N.Y.; **Oscar Horovitz**, Assistant Secretary, 33 Island Street, Boston, Mass. 02119

23

Laurence E. Barstow reports one child and one grandchild and that he is "not retired as yet. Have yet to see commencement at M.I.T." . . . The C & EN, July 31, 1967, reports: "The first meeting of the task force committee for the 'Chemistry in Industry' study was held in Washington April 20-21 under the chairmanship of Dr. **Robert L. Hershey**. It is expected that the report will document the input of chemistry into the nation's economy and the overall importance of the science of chemistry to society in general." . . . In a letter from **David W. Skinner**, our Class President, to all classmates on September 6, 1967, he says: "Another year has rolled by, and we are now approaching our 45th Reunion next June. You have received the preliminary announcement, but we have already had to change our plans. After the announcement we received a letter from the Oyster Harbors Club notifying us that their Board of Directors had voted to close the Club to outside parties at the end of this season." Dave goes on to say, "Please answer our mailing, and if you've lost the form just write a letter to me or Forrest Lange with news about yourself. And the best news would be that you are planning to be here next June." In reporting on the Alumni Fund Dave says, "Remember, as little as \$10.00 (contributed to the Alumni Fund) will get your name on the list and entitle you to a subscription to the *Technology Review*." In September Dave was successful in making arrangements for our 45th Class Reunion to be held June 6 to the 9th, 1968, at the Blue Water Inn (on Cape Cod), 328 Winter Street, Hyannis, Mass. The Class dinner will be on Saturday evening June 8, 1968.

You will receive further mailings on the Reunion. In the meantime, unless you have done this, please forward your check for \$10.00 for Class dues, which is only collected once every five years. Notification has been received of the following changes of address: **Charles H. Ducote**, Van Ness North 3001 Veasey Terrace, N.W. Washington, D.C. 20008; **Edwin R. Richards**, Bigelow Apartments 329, Pittsburgh, Pa. 15219; **Alcott L. Hooper**, Vershire, Vt. 05079.—**Forrest F. Lange**, Secretary, 1196 Woodbury

Ave., Portsmouth, N.H. 03801; **Bertrand A. McKittrick**, Assistant Secretary, 78 Fletcher Street, Lowell, Mass. 01852

24

You may remember that **Robert W. Stewart** was head man for Singer in Scotland (maybe the United Kingdom?) for some years, came back home to be Vice President in charge of research and development, and a year or so ago retired to the green foothills of New Hampshire. Evidently the life of a country gentleman needed at least a touch of the business world. Recently he was elected a Director of N.H. Ball Bearings, Inc., in Peterborough. . . . **Ed Hanley** collects directorships as a hobby. He is a Director of the Pennsylvania Railroad, Titanium Metals Corporation, Duquesne Light, and a half dozen or so more. His latest: National Lead. As Board Chairman of Allegheny Ludlum Steel, Ed has recently launched his company into the consumer field. You can now buy golf clubs, trowels, fishing rods, and a varied assortment of things that will contribute to his salary. He has bought the True Temper Corporation. Maybe you'll even see him plugging his wares on TV. "Just think," said Ed, "they have 25 spots on the 'Today' and 'Tonight' shows!" . . . This one is a bit fuzzy, but it's probably important. A three-page story in *Aviation Week and Space Technology* features **Otto C. Koppen** inveighing against STOL requirements. We've read it thoroughly, and it's still fuzzy. STOL is "short takeoff and landing." Otto says that unless STOL certification requirements are reoriented more strongly to the operational requirements of STOL aircraft than at present, "a massive game of Russian roulette" will be played in the future city-center operations. That makes it sound of prime importance, but this writer's flying career came to an end almost 40 years ago. If you're interested, Professor Emeritus Koppen of M.I.T. is the man who can give you the scoop.

Luang Videt-Yontrakich is still in Washington, D.C. "I have nothing much to do except give a few lectures here and there." His son Pete is at Exeter and daughter Parita at Walt Whitman High School. . . . Another Washingtonian is **George M. McIlveen**. For many years George was a steel man, and more recently with American Tool Works in Cincinnati. About two years ago he did a complete switch and became a government man. "Gladys and I are enjoying our new adventure. Am now associated with IROQUOIS Project Manager's Office, U.S. Army Materiel Command Headquarters, as Chief of International Logistics Division (UH-1 series helicopters)." Bet he never had a title that impressive, or at least that lengthy, before. . . . And after 34 years still a third Washingtonian, **Clarence M. Chaffee, Jr.**, left government service last spring. A mining engineer, Clarence held the post of Strategic and Critical Materials Management Specialist. During

W.W.II he was the purchaser of all metals for the Lend-Lease effort. And that was a lot of metals! . . . **Robert O. Dehlendorf** retired to California and is "enjoying existence on Social Security under the Great Society." Just in case you think those Social Security checks are petty cash, just see what the Dehlandorfs are doing. "We just got back from two weeks in the Islands, have a '67 Calais, our third son graduated last June from Stanford's business school. So it's L.B.J. all the way!" Their eldest son, another business school graduate of 12 years ago, but Harvard that time, has just been named President of a large West Coast corporation, unnamed.

Other retirees: **Alexander M. Liff**, **Carl F. Muckenhoupt**, and **John B. Gegan**, the latter from both N.E. Telephone and Telegraph, and the Army reserves in which he was a colonel. . . . Professor **Robert P. Siskind** still has three years to go at Purdue. Evidently they work their faculty longer than does M.I.T. since Bob reached 65 last June. A year ago when he was traveling through New England he "had a fine short visit with **Leigh Fogg**. Leigh was in fine shape and enjoying his retirement in Gorham, N. H." . . . **Norris Johnston** got his S.B. and S.M. in electrochemical engineering then went to Cal. Tech. for his doctorate. He says he's retired but is keeping his hand in with a few little projects. How's this for a lineup: recovery of heavy oil, three electronic tools for oil well application, bacteriological application for waterflood oil recovery, recovery of heavy minerals from dry placers and lode mines, humidity sensor for aircraft, oil exploration by radiation method. Well, like the man says, we should all have a few hobbies. . . . **H. Easton McMahon** started with us but soon transferred to Princeton. Now he is a distinguished physician, Chairman of the Board of Directors, New York Cardiological Society, also of the Bylaws Committee of the American College of Chest Physicians. Like the man also says, this is an age of specialization. But he still remembers one of his biggest thrills when, with gentleman **Jack Cannon**, he raised the '24 banner on "the flagpole on the banks of the Charles at 4 a.m. on a cold morning in November, 1920."

A couple of your classmates who probably have no notion of ever retiring do manage to work in a few out-of-season vacations now and then. The **Wilmot G. Peirces** headed for Mexico City in October. It was for only a few days, and may have been combining business with pleasure. But if they made connections with **Nish Cornish**, the betting is more than even they'll return at Fiesta time sometime in the near future. Also in October, the **J. Adalberto Roigs** took off for South America. They hoped to see **Johnnie Fitch**, **Dolph Santos**, and **Domingo Bellingeri** while there. Al and Dolph played varsity soccer together, but haven't seen one another since 1924. "No fishing this trip," says Al, "but I expect to do some in Acapulco in early December during the

XXV International Light Tackle Association Tournament, which association and tournament I again preside over this year." So who needs to retire?—**Henry B. Kane**, Secretary, Lincoln Road, Lincoln Center, Mass. 01773

25

A few news clippings received during the past month bring interesting notes regarding several classmates. **John M. Campbell**, who has been Scientific Director of the General Motors Research Laboratories in Detroit, was named Special Assistant to **Lawrence R. Hafstad**, Vice President in charge of the Research Laboratories. This appointment was effective on July 1, 1967. John will assume new duties in the automotive emission field and other activities involving advanced research programs.

... **Arthur F. Merewether**, S.M., retired manager of weather services for American Airlines, had conferred upon him the Cleveland Abbe Award for Distinguished Service to Atmospheric Sciences by an individual. In receiving the award he was cited for his long and valuable service to the meteorological profession during which his influence in aviation meteorology has been a profound one, as an administrator, as a force to initiate change for progress, and as a pioneer pilot and meteorologist with breadth of vision in both military and commercial weather service. After receiving his S.M. with the Class of 1925 at M.I.T., Arthur had early careers in chemistry and professional baseball, studied meteorology for a time at the Institute, and in 1935 entered the Army Air Corps as a weather officer. From 1939 through 1942 he was Chief of the Army's Weather Service and for the following four years Regional Control Officer of the 8th Weather Region in the North Atlantic. It was during this period that he discovered the meteoritic crater and lake in Labrador which, after confirmation by an expedition in 1955, was named for him. For his contribution during the war years he earned the Legion of Merit as well as the rank of Honorary Commander, Order of the British Empire. Upon retirement from the Air Force in 1946 he joined American Airlines.

From the *American Paint Journal* we learn that **Temple Patton**, S. M., nationally known author of books on alkyd resin technology and paint flow and pigment dispersion, spoke to the New York Society for Paint Technology last spring on "Fundamentals and Advances in Urethane Coating Technology."... George Smith, '26, provided information that **Edward N. Wendell** of Rockport, Mass., and Boca Raton, Fla., died on September 24, 1967, in the New England Baptist Hospital in Boston. Ed had spent most of his working life as an executive for International Telephone & Telegraph Corporation. Prior to World War II he was assigned to the company's European operations. He was responsible for installing the com-

munications system on the *Queen Mary*, which is now making its final voyage. He also helped with the early development of navigating instruments used by aircraft. During World War II he became the Vice President in charge of IT&T's principal U. S. subsidiary, Federal Telephone & Radio Corporation, a leading producer of telephone, radio and electronic equipment. He received the Navy's Certificate of Commendation for outstanding accomplishments in the war effort. Later he became IT&T's technical director. Due to illness he retired in 1955. . . . The Alumni Register notes the passing of **Leno Gregory** in Cranston, R.I., on August 23, 1967. . . . In last month's notes there was expressed curiosity as to the change in address for **John E. Black**, noting he was in Rome, Italy. That address was quite temporary because he is now back in Summit, N.J.—**F. L. Foster**, Secretary, Room E19-702, M.I.T., Cambridge, Mass. 02139

26

This month's notes will be an assembly job. We have several release letters etc. to save the day. We had written **Elton Staples** asking him to explain his Florida address and find that he is in Japan and that this is his U.S. forwarding address. In his letter he said: "After the 40th Reunion we visited friends in Chatham and decided that is the place to live, summers anyway. So we acquired a small lot on Ryder's Cove and talked with builders. But when I talked with our new President about early retirement, he asked me to go to Japan to set up a new company. So here we are in Ashiya, halfway between Kobe and Osaka, and I am President of Koyo Lindberg Hevi-Duty, Ltd., a new joint venture company which began operating on July 1. Miriam joined me April 1, after selling our Lake Forest home and spending the late winter in Orlando. I miss the *Tech Review*."

Standard Oil Company (New Jersey) has provided us with two releases this month on eminent classmates who are retiring. The first is on **Sparky Turner** who hasn't shown his face in 40 years so we were glad to catch up on him as follows: "S. D. Turner will retire at the end of November, 1967, as Middle East Coordinator after a career of more than 39 years with the Jersey Standard organization. Mr. Turner joined Humble Oil & Refining Company as an engineer at the Baytown, Texas,



Edward J. Hanley, '24



Edwin J. Gohr, '26

refinery in 1928 and in 1938 came to New York in Jersey's Coordination and Petroleum Economics Department. From 1943 to 1945 he served in the U. S. State Department as Petroleum Attache in London. After the war Mr. Turner returned to Jersey and in 1947 was appointed as a company's representative in London working principally on Middle East affairs. In 1954 he was appointed Middle East Advisor, and Middle East Coordinator in 1960 when the post was created in Jersey's New York City headquarters." The other release on **Ed Gohr** indicates that he and Sparky were with the company about the same number of years. Ed's story says: "Edwin J. Gohr, a pioneer in petroleum process research and one of the men responsible for developing fluid catalytic cracking, the most widely used process for making high-quality gasoline and other oil products, will retire July 15 from Esso Research and Engineering Company. Mr. Gohr, a Vice President since 1949, has been with the company 40 years. His retirement nearly coincides with the 25th anniversary of the start-up of the world's first fluid catalytic cracking unit, located at Baton Rouge, La. Mr. Gohr was directly responsible for the design of the unit and personally obtained the first oil sample from it on May 25, 1942. Throughout his career he was associated with the development of many major petroleum processes. In addition to fluid catalytic cracking these included catalytic reforming, hydrocracking, hydrofining and fluid coking. He has been awarded 27 U. S. patents. Mr. Gohr and his wife, the former Polly McIntyre, reside in New York City."

Another release brings us up to date on **Jim Killian's** latest activity: "Charles A. Coolidge, Chairman of the Board of Trustees of the MITRE Corporation, has announced that his successor will be Dr. James R. Killian, Chairman of the Corporation of the Massachusetts Institute of Technology and a MITRE Trustee since 1960. MITRE, a systems engineering organization with headquarters in Bedford, is engaged in the design and development of electronic command and control systems and serves as technical advisor for the Air Force, the Department of Defense, the National Aeronautics and Space Administration, the Federal Aviation Administration, and the Office of High Speed Ground Transportation."... Now for several more quickie reports on retiring classmates that came back with a mailing of the Alumni Fund. We will quote from them: "Retiring from the V.M.I. faculty 6/30/67 (civil engineering department) after teaching 46 years! **John H. C. Mann**."... "Retired 4/8/67 from Naval Ship Engineering Center, **Theodore E. Norton**."... "Decided to retire 6/30/67, a little early, but I've got so many things to do I can't wait! **Duryea E. Elmendorf**."... "Retired on 4/1/67 at age 65 (mandatory) from United States Smelting Refining and Mining Company after 36 years of active service as mining engineer and geologist. Available for private consulting

work in mining and geology after 7/1/67. Specialty—exploration work and valuation of mineral properties, **W. H. Graves, Jr.** We were never what one could call a retiring class, but with all these reports coming in we may have to accept such a classification. Your Secretary hasn't mentioned Pigeon Cove because these notes are being put together during the lunch hour in order to meet the deadline. Everything is fine at the Cove. We had dinner with Margaret and **Pete Doelger** the other night in Rockport just before they took off for Palm Beach. Pete, I'm sure, has the Class championship for hair, not only a full head of hair but only three gray hairs, just enough to prove it's not due to Miss Clairol. One reason these notes are getting done during the lunch hour is that Class Agent **Pink Salmon** was unable to meet us for lunch. We are planning a get-together next week. It's hard to realize that we are writing December notes, but that being the case, merry Christmas to all and cherrio until next year—**George Warren Smith**, Secretary, Pigeon Cove, Mass.

27

Now that the hoopla of the 40th is all part of history, the notes will be getting back to the hard core of the news from month to month. It is very seldom now that the notes can now be written without reporting the death of a classmate. All the more so this time with four months having gone by since our last report. **Arnold M. Greenhalge** died in May of this year in Haverhill. Our addresses have always shown Haverhill without any indication of his business. He came to Tech from Haverhill High School and graduated in civil engineering. . . . About a year earlier **Paul B. Gebhardt**, who was in Course VI, died in Towson, Md. To our knowledge he had been in the Baltimore area since 1949 representing several firms as sales-engineer. Earlier he had been in Kansas City with Western Auto Supply. . . . **Maneck P. Kanga**, who received a master's degree in fuel and gas engineering with our Class, died in Bombay, India, this July. An early record shows that he was employed by the Indian government. . . . Better known to us was Professor **William L. Sullivan** of the Stevens Institute of Technology who died in March of this year. Bill was at Class Day in 1961. He received both his S.B. and S.M. degrees in electrical engineering at M.I.T. and was the head of his department at Stevens. His summers were spent at Lake Winnepesaukee where there were many chances for his avocations of boating, mountain climbing and oil painting. He came to Tech from Beverly High School.

John M. Kochanczyk, who died July 10, 1967, was born in Lawrence, attended Lawrence High School, and at Tech received his degree in Course I. After working for New York City in tunnel construction and highway design, he joined the N.Y.C. Board of Water Supply in

1930, and this became his lifetime career. He was a major in the New York National Guard. . . . **Raymond B. Block's** widow advised of his death on November 14, 1966, at Fort Walton Beach, Fla., where he had lived since 1959. Prior to that he worked in Springfield and Dayton, Ohio; he was in the U.S. Army in World War II. He entered Tech from Hartford, Conn., High School and took his S.B. in mathematics. . . . After a lifetime career with DuPont, **J. Raymond Buckley** has retired, his last assignment having been as Manager of the Personnel Relations Division of the Fabrics & Finishes Department. Ray had completed 40 years of service which included technical and manufacturing management posts, as well as personnel relations. He worked in Toledo, Flint, New York (where we were neighbors) and doubtless many other places, including Wilmington where he now lives. . . . **Phil Darling** writes that he was sorry to miss the Reunion and that he has a new address in Houston: 3615 Murworth. . . . In sending his Reunion regrets, **Larry Coffin** adds that he is Production Manager for the Far East and South Africa for the Goodyear International Corporation. His headquarters are in Akron, but his duties take him to all parts of the world. He says interestingly, "This area is not at all as portrayed by the American view of Vietnam, and truly needs American know-how and technology. The application of this will have to come from the dedicated efforts of private enterprise and various governments of the world to train and educate the people. The desire is there, and individually the people are earnest and want to get ahead. But it is not easy for them."

Thirty members of the Class were invited to attend the M.I.T. Alumni Officers' Conference at San Francisco in September. I don't know how many of the Class were able to get there, except for **Bud Fisher** who did. He says he is none the worse for wear after his long and strenuous Class Gift campaign. (How many of you were reached long distance by "Fisher's Foners"? The results were outstanding.) . . . We have a new address for **Harland Sisk**: 1 Hillsea Road, Box 192, Yarmouth Port, Mass. 02675, just the address for retirement, and Harland has in fact retired from General Electric after 40 years with the company. The Pittsfield *Berkshire Eagle* says, "A crusty New Englander, Mr. Sisk has built a reputation as one of G.E.'s most effective department general managers since he took over the distribution transformer operations in 1960. Under his leadership the department has developed new designs that reduced the size of pole-type transformers and placed them in a more attractive capsule, and has made progress in underground distribution systems." . . . I was delighted and surprised last June to hear **Erik Hofman's** voice on the phone, and he was on his way to the house if I would give him the final directions. We had a good visit. Erik's basic home is the island of Mallorca, but on this visit to the States he

was making a tour of old familiar sights and friends in New England. He and his wife Tibby are still most enthusiastic about their Mediterranean life. And it does sound idyllic. A postcard on their return brought news that Betty and **Bud Gillies** had been visitors at Formentor on Mallorca. . . . **Ed Damon** is still spending a lot of time out of the country. This last card was from Durban, South Africa. Ed's reports always show him to be an enthusiastic traveler.

Maury James had planned to attend the Reunion, but last January Bucyrus-Erie Company decided he was needed in Japan on a long term basis as General Advisor to Komatsu-Bucyrus, Tokyo. In Tokyo Maury has seen **George Darling** a couple of times. George is Director of the Atomic Bomb Casualty Commission stationed in Hiroshima, an assignment which fits well with his technical and medical training. Maury sends a cordial invitation to visitors to Japan to look him up at the Komatsu Building in Tokyo. . . . **Glenn Jackson** was the faithful correspondent right down to the end of his stay in Iran. In August he wrote, having heard all the reports of the Reunion that he hated so to miss. This letter told of his final plans to return to New Hampshire via India, Hong Kong, Australia, the South Pacific islands, Hawaii, and many way stations. He says the end of the rainbow will be one large lobster and a quart of steamed clams. By now he has surely had them. A visitor in Teheran was **Casey Kazazian**, who had just been to the Reunion. After a week of search he and his daughter found the Jacksons. (The embassy had them recorded under Elizabeth Jackson.) Casey brought the paper with all our signatures and good wishes from the Reunion. From Iran, Casey was headed for Armenia, Georgia and Moscow. . . . Did you see **Russ Westenhoff's** picture on the cover of the July 6 *Engineering News-Record*? **Johnny Drisko** sent me his copy. It is a terrific likeness, and the accompanying story tells interestingly how Ford Bacon & Davis "roll up their sleeves and get their hands dirty." President Russ calls himself a "greenhorn in the 73-year-old firm." . . . Please don't forget that we want to use pictures in this column. Send in snapshots or formal poses.—**Joseph S. Harris**, Secretary, Masons Island, Mystic, Conn. 06355

28

We are indebted this month to Florence Joep and **Jim Donovan** for Class Review reports. The letter from Florence follows: "The fall season got off to a good start for the Class of '28 when Edythe and **Dick Rubin** were the hospitable host and hostess to the Reunion Committee at their gracious home in Dover, Mass., on October 1. El and Beryl Atwood, Frannie Donovan (Jim was en route to the West Coast Tech meeting), Carl and Betty Feldman, Helen Harris, Florence Joep, Dave Mathoff, Art and Mary Nichols, Dave and Gladys Olken, Ed

and Pat Poitras, Will and Anne Tibbetts, Abe and Ruth Woolf, and Charlie and Velma Worthen not only enjoyed all the tasty accompaniments of a delicious supper and the gaiety 'when good fellows get together' but also the added cause for celebration when the Red Sox routers have another day to remember! More serious business followed under Reunion Chairman Abe's guidance with progress reports on reunion plans, such as . . . but why spoil the suspense thus early? Just start now making your plans for June 7 to 10 on campus in the luxurious McCormick Hall, part of the 'New Tech.' We promise you that the men, and women, of the committee are working hard to make this a 'fabulous 40th!' So, get your pen in hand and be ready for the first flyer coming soon. The summer mail brought news of **Johnny Melcher's** family, an announcement of daughter Pamela Jill's marriage to Mr. Arthur Hideyuki Okazaki. **George Chatfield** has combined his advertising skills and his civic interests in serving as the Chairman of the United Fund Campaign of Greater Fitchburg, Mass. The kickoff dinner found George and his charming Marie at the head table with the guest speaker none other than U.S. Senator Edward W. Brooke. George is now President of radio station WFGL and the Music Service Corporation, Publisher of the *Montachusett Review*, Director of the Y.M.C.A., the Greater Fitchburg Chamber of Commerce and the Rotary Club. An Advisory Director of the Worcester County National Bank, he is also a member of the North-South Toll Road Commission and, as such, recently presented his report before the State Legislature."

From five memos from our Class Chairman Jim Donovan we quote all of the following: "Talked with **Chet Day** on the telephone recently. Says that he is very busy developing the data for this highly publicized FCC study of the telephone company. This has put so much extra work on Chet that he cannot devote much time to Class affairs, but he is certainly looking forward to the reunion next June as a pleasant respite . . . As you know, there was an Alumni Officers' Conference in San Francisco in September and I attended—what I called the first vacation in 20 years. I had the pleasure of meeting with **Fitch Briggs** and his wife and Clara and **Bill Archibald** . . . Fitch is retired. He was traveling and having a marvelous time. He looked well, and he and his wife were good fun. Bill and Clara were also good company and wonderful to see. One of their sons was on the coast with the Navy, and they had the good fortune to see him . . . Frannie and I have had an airmail post card from Ruth and **George Bernat**: 'Spending 2½ months touring Africa. Western Africa was colorful and interesting but difficult. Johannesburg is just like any other city in Europe or America.' . . . I forgot to mention earlier that at the Alumni Officers' Conference in San Francisco our classmate **James S. Morse** of Hillsborough, Calif., had lunch consisting of a martini (Why waste calories

on mere food!) with me. Jim had worked in the oil industry across the United States and into Australia and New Zealand and, if I remember accurately, Indonesia. He is now retired and puts real effort into work for M.I.T. . . . **Stan Humphrey** is now retired, which means that he goes to the office every day but spends at least some of his time working for M.I.T. He is Special Gifts Chairman for the Detroit area. **Bill Archibald** has the same job in Pittsburgh . . . A perusal of a list of certificate awards given for particularly active and effective work in connection with the 1967 Alumni Fund indicates an award given to **John J. Hartz** who is retiring as a Fund Board member. Certificate awards were also presented to **Charles E. Worthen**, who is our absolutely superb Class Agent; to **Homer Burnell, Jr.**, who is Special Gifts Chairman in Chicago; to Bill Archibald, Special Gifts Chairman in Pittsburgh; and to **Jim Morse**, who is Regional Chairman for San Mateo, Calif., which, incidentally, is an area with one of the highest number of contributors to the Fund."—**Hermon S. Swartz**, Secretary, Construction Publishing Company, Inc., 27 Muzzey St., Lexington, Mass. 02173

29

Wonderful warm weather prevailed September 8-10 for the seminar on "Cities in Crisis." One of the many highlights was a penetrating presentation by Moshe Safdie, the architect of Habitat '67, who exhibited the original model of his design of high density housing at Expo '67 in Montreal. Starting from minimum necessary for human survival, he led us through the picture of a thoughtful analysis of avoidance of a stereotype to a conclusion of three-dimensional living facilities which should be planned on as broad a basis as 15 to 38 acres in urban renewal and up to 100 acres in the suburbs. Being chauvinistic, our Class of '29 outnumbered most other classes in attendance, at least according to the roster of registrants. We saw Doris and **Bill Baumrucker** who has accepted the chairmanship of the 40th Reunion, for which we extend thanks; **Wally Gale** brought his wife Joan who had not attended last year; Betty and **Dan MacDaniel** were there; **Tom Speller** came even though he and his wife were leaving for a driving trip through England; and Olive and **John Rich** were also present and accounted for. All in all, it was a most interesting weekend. . . . We were sorry to learn that **Gordon Williams'** son had a severe accident in a taxi in Rio de Janeiro, but understand that he is coming along reasonably well now. . . . We received a biography from a recent issue of the *New England Real Estate Journal* on **Marshall S. David** who is employed by the Boston Gas Company. To requite Marshall on getting along with others, "Ever since I played baseball at college and in the sand lots and then umpired, I have believed in the importance of team work."

For those few who haven't deciphered

last month's clue as to **Hunter Rouse's** last known whereabouts, we quote his August 30 letter: "Now that you have used up all your questionnaire material, perhaps some uninvited correspondence will help you maintain your unbroken series of '29 columns. At the moment I'm in Romania, on a three-week academy lecture exchange, yet I seem to be profiting more as a tourist than as an engineer. On a six-day trip to the north by car, for instance, we must have inspected ten monasteries for every hydroelectric plant. The wine, moreover, is superb. I recall the country in 1931 as having a very rich top class and a very poor bottom class, with nothing in between. Now everybody is supposed to be in the middle. But intellectual position forms just as much a class distinction as wealth once did. On the way here I stopped to see our oldest son, daughter-in-law, and two grandchildren of Oxford, where U.C.L.A. has sent him to do research in medieval history; and our daughter, son-in-law, and two more grandchildren at Bad Kreuznach where the army has them stationed. Our second son, a perennial student, and second daughter-in-law, called on us at Iowa City from Washington just before I left. My wife claims to be having a fine vacation with me out of house and country." . . . Actually, we still have one questionnaire left from **Vinton L. Yeaton** of Hampton Falls, N.H., who advises he is retired from the U.S. Civil Service through disability. Vinton and his wife, Mildred, have two children and five grandchildren.—**John P. Rich**, Secretary, Box 503, Nashua, N.H. 03060

32

We have word from **James E. Harper** from Arlington, Va., that several members of the Class attended the Alumni Officers' Conference held in San Francisco in September. Jim writes that it was a very worthwhile meeting and that his wife accompanied him and enjoyed her first visit to California. Also attending was **Rolf Eliassen** from Palo Alto who was preparing to take his family on an ocean trip. **Gaynor Langsdorf** attended and has recently been in the Middle East with the World Affairs Council concerned with the problem of refugees. Gaynor is Manager for Executive Development with Standard Oil Company of California in San Francisco. **Albert A. Stewart** attended from Rhode Island where he has been elected President of the M.I.T. Club of Fall River. Albert is Associate Professor of Engineering at Southeastern Technological Institute. **Lester Glickman** also from Rhode Island attended. He has been elected Vice President of the M.I.T. Club of Fall River. . . . An answer from **Charles G. Wyatt** to a letter from **Bob Semple** explains why his mail doesn't catch up with him. Charles writes that one of the subsidiary companies of Wyatt and Kipper Engineers Inc. of Seattle, Wash., started overseas work about eight years ago, and they got so busy that he has been out of the country almost continuously for the past six

years. For the past three years he has called Manila his temporary home, but his work is scattered between Turkey, Pakistan, India, Vietnam, and Korea. . . . In accepting the appointment as Vice President for Latin America of the Class of '32 **Julio J. Gallese** writes that he will try to see some of us the next time he visits the U.S.A., and that he would be glad to see any of us who come to Lima, Peru.—**Elwood W. Schafer**, Secretary, Room 13-2145, M.I.T., Cambridge, Mass. 02139

33

Only once each year does this writer get a chance to say to one and all merry Christmas and a very happy New Year. This is it, and may God bless the great 1933 M.I.T. family. . . . In the November issue we made mention of the fact that the **Bill Barkleys** of Schenectady and Hampton Beach, N.H., are parents of twin girls, both now college girls. I know that it would be interesting to assemble through this column a twin roster. So, proud parents of twins please send in the story on each set; triplets and quadruplets are also notable and eligible for the roster. . . . Through a slip in my amateur filing system, I mislaid a fine letter from **John Rumsey** which should have been used in the November notes. John is with Jervis B. Webb Company of Detroit, manufacturers of material handling equipment, such as all the equipment for handling the U.S. mails at the new Boston Post Office (a \$9,000,000 contract, no less). He is active: "Member of the Detroit Chapter, Int. Materials Handling Society, Director of the Detroit M.I.T. Club, Regional Chairman of the M.I.T. Educational Councilors, President of the Bloomfield Township Library Board now in the process of building a \$1,500,000 library." The Rumseys have few hobbies, it says here, all done poorly: skiing, sailing, tennis and bridge. They skied in Switzerland last February with the Howie Reicharts ('34). And, now the punch line, "See you at the 35th."

With quite a large number of press clippings, I now choose to get the first half out of the way. **George Parmakian** has recently been appointed Chief Mechanical Engineer of Riley Stoker Corporation, Worcester, Mass. George has been with Riley since 1946, and before that was with Babcock and Wilcox, and before B. & W. was an instructor in mechanical engineering and research assistant in civil engineering. He is the author of a number of technical papers on steam generation and holds a number of patents in this field. . . . **E. R. Gilliland**, Head of the Department of Chemical Engineering at M.I.T., is mentioned as a member of a nine-man committee of judges appointed to choose the winner of the Kirkpatrick Award, an honor of achievement in chemical engineering given for chemical engineering problems solved, the novelty of the technology, and commercial success. It goes only to a company, a group of companies, or a department within a company, and is

awarded biennially. . . . A very short one from California mentions Major General **William E. Potter** at a seminar of the Building Contractors of America, California Chapter. At this seminar the general presented a 25-minute color film on "Disney-World" (the last directed by Walt Disney). General Joe was Executive Vice President of the New York World's Fair and was with the Army Corps of Engineers for many years in building construction. More recently he has been with Disneyland. . . . We have one more, somewhat more complete, story of **Bob Winters** and his latest honorary degree, from Dartmouth. This was covered in the July issue of the *Review*, but Bob's speech, the commencement address, was not available at that time and hence requires some attention here. We cannot hope to make any complete coverage of this speech as it is rather long. The title is "Education's Marshall Plan," and a remarkable document it is. I wish I could quote it word for word. I will assume, arbitrarily, that Bob will send any of you who ask a copy of this fine speech. "Through the Economic and Social Council and a number of specialized agencies the United Nations puts four of every five U.N. dollars to work to relieve the sufferings of the Third World, those 77 nations where per capita incomes are less than \$250 per annum." Bob notes, "the big function that remains is that of providing a bridge or a set of bridges across the gulf between the richer and the poorer countries, and this tends to bridge a gulf between races and cultures." Just 20 years ago there was launched an aid program called the Marshall Plan, described by Winston Churchill as the 'most unsordid act in history.' This bold and generous initiative helped the war-ravaged nations of Europe back to their feet. Today, not two decades later, it is perhaps not too inappropriate to contemplate a new plan, now directed not east but south, and providing not physical but human capital."

Dave Lee makes the news in Detroit, through the *Automotive News* in a short biography. Dave is Advertising Manager of the Truck Division, Ford Motor Company, and has been since 1961. Before that he was with Chrysler, having started in the automobile business as a student engineer in 1934 at Chrysler. . . . A mention only of **Draveaux Bender** came in an earlier issue of the *Boston Globe*. It took four months to get to the desk of ye Scribe, slow traveling for 50 miles. Drav was recognized along with nine others at a meeting of the New England Chapter of the American Institute of Planners held in Waltham in April. The 10 men honored were selected for their long and distinguished service in regional and city planning. I expect that most of these city planners are architects, as is Draveaux. . . . We have a short one from our faithful **Beau Whitton**, our foreign office man from North Carolina. It appears that **Wilber Huston**, complete with wife and two boys, went recently to N.C. for a family reunion and had lunch with the Whittons. Nothing at all this time about the Whittons, but Bill Huston

is with the NIMBUS Satellite program. . . . Another and very welcome note from our Texas correspondent, **Bill Harper**, who holds forth at some length on those of our chaps who are not the regular readers that they should be. As Prexy of the Texas Chiropractic College, Bill says he is in fund raising and is business manager, arbitrator. He is in the middle of a 10-year, \$2,500,000 fund raising program, and busy he is. . . . I have a very fine note from **Vivian Drenckhahn**, and she writes that she is retired from teaching at the University of Honolulu and will spend four months on Mexico starting around Thanksgiving time. I had asked her to be the Chairman of the Ladies Committee for the 35th. She is perfectly willing to take on the job, but will be otherwise engaged during the four crucial months. So I fear that my luck has run out again and I must seek a little further for a coed chairman. She asks if we enjoyed Hawaii, and I have to admit that we expect to but won't sail until next week.

The Alumni Officers' Conference in San Francisco has been adjourned only an hour or so as I write trying to make an October 10 deadline. This event will be reported much better and more fully elsewhere, so I shall content myself with a few personalities. From our Class we had an average sort of attendance: Vice Presidents **Dick Fossett** and **Charalee**, **Ellis Littmann** and **Roz**, your Secretary with **Leona**, **Francis Merchant**

Reduced Travel Rates FOR M.I.T. ALUMNI



Tours to the Orient, India

For details see page 112

and Elsie, from Long Beach, Calif., and **Westy Westaway**. It was a real pleasure to see Dick Fossett after all those years, and to see Francis Merchant for the first time. Westy I see quite often as he is usually in evidence no matter what the M.I.T. event is. It was generally agreed that the Regional Alumni Officers' Conference has its merits, and also that no preceding conference was as good or as well run as this one. John Mattill, Don Severance and Fred Lehmann, and the rest of the competent staff deserve a lot of credit. . . . Now turns up a letter from **Henry Kiley**, written a little earlier in the month. Before someone gets it into print earlier than I can, I will try to explain something. The interim letter was mailed early this month, and the machine must have broken down temporarily as pages five and six were missing from some letters. I had several requests for the missing pages, and these were sent out promptly. But there may have been others who did not get these two pages, and the Alumni staff has sent me enough of them to make an extra mailing if any more requests come in. So, among other things, Henry wrote for the two missing pages. Henry is still with W. R. Grace and Company, Overseas Chemical Division, with plants all over the earth except the Americas which are served by the various domestic divisions. Henry and Betty are well and live the quiet life, he says; travel a bit and keep in touch with their three unmarried children. Mary is a Smith '61 graduate and is in research for *Readers Digest*; Henry, Jr., is a captain pilot in the U.S.A.F. in England. He graduated from Notre Dame in 1963; Kevin is a senior at Tufts right now and will go into the Navy as an ensign come June next. . . . For what it is worth, I have a bull fight poster from **Walt Skees** who was evidently visiting in Spain. No message, so no comment.

In response to an invitation from Leona and me, I have a fine letter from Catherine Taul, wife of **Wayne Taul** of Fresno, Calif. We had in mind running a cocktail party at the Conference, asking a few from California among others. So, Catherine writes that they cannot make it but was more than kind in writing such a nice long letter of regret. You might recall that Wayne was one of two West Point men in our Class, both of them during the last two years. **Charles Keller** was the other. It appears that the Tauls are now residents of Fresno, though they spent part of the war period back at the Point. Though the letter was excellent, the best part of this deal is that I have now started to hear from the wives, which might well become an advanced kind of improvement. Most women learned to write as children, which, I fear, did not happen to some of the boys. . . . **Cal Mohr** and some others seem to have tried to find **Mort Williams** a while ago, and someone asked me if I could find him. Mort replied right off, and says that he has not moved in some time. He verifies both of his addresses, business and home, and he contemplates no change for a long time. He writes a condensed and interest-

ing story. They have two sons and two grandsons. Mort is apparently very active in the Presbyterian Church of the Covenant, which takes two or three evenings per week, and then he devotes plenty of time to the care of his home lawn and grounds. One of his grandchildren lives in Oakland, Calif., and the other in Newark, Del. Visiting these two, plus a brother-in-law in Nebraska, keeps the Williams busy. . . . Just to indicate that you are getting the very best, I wish to announce that I have a letter from a Kenyon College man, 1933, who reads the *Review* cover to cover every issue. He reads the copy that is sent to an Alumnus of ours, Willard Morain, '30. He thinks that '33 is our best Class, which agrees with my own opinion, and he complains that his own alumni paper cannot compare with ours.

When Leona and I decided to go to Hawaii, after the Officers Conference, I wrote a short note to **Clare Farr** asking him about his children in Hawaii, and also about **Frank Der Yuen**. Clare responds with some info. His son and daughter-in-law do, as of September, live in Hawaii, but they leave for Stanford U. to pursue his studies leading to his doctorate. Sue, his son's wife, got a masters, presumably in Hawaii, while Dick was working at a Honolulu television station. Clare is happy to announce that a grandchild is due most any day (#1). The other son of the Farris, Robert, was married in Sunnyvale, Calif., July 15, 1967, and the happy couple is living in Mountain View, Calif. . . . **Stan Walters** of East Sullivan, N.H., writes a nice note. First, Stan and Dorothy definitely will make the 35th. Stan tells of the ups and downs of the selling business. He passes through Exeter once in a while and will call. He just got a card from **John Sterner** of Miami who is on a long trip, Expo 67, thence across Canada to Banff and Lake Louise on his way to visit with his daughter in San Francisco. John it seems is Vice President and Treasurer of the Corddis Company of Miami, Fla. . . . Another missing page story, this time from **Bob Richardson**, Course II, from Rhode Island. Bob has had a varied career, apparently very interesting. He had to drop out of Tech in the junior year. So he successively ran a gas station for four years, was cost accountant for a jewelry manufacturer for four more years, after that he made shoes for Commonwealth Shoe and Leather (Bostonian), and wound up as Assistant Treasurer and Controller, then a short Army stint. Then he spent a year with Bell Aircraft, after which he went with Farrington Mfg. Company of Charga-Plate & Charga-card and lived there 16 years as Head of the Industrial Engineering Division; thence to working for Uncle Sam, he says, and for seven years he has been with the Naval Underwater Station at Newport, R.I., as Head of the Program Planning and Evaluation Division and expects to be at this job for a 100 years. Gwen and Bob have four children from 20 to 32 years. The three eldest are married, and there are five grandchildren. The youngest, Bob, Jr., is in the Army

as of now. Bob and Gwen will be with us come June 7-8-9, 1968. Many of our mutual friends like **Frank Amadon**, **Al Moeller**, and **Steve Rhodes** will be pleased to hear from Bob through this column. . . . This, my friends, is merry Christmas month, and we hope that it will be just that. There are a few address changes as follows (with addresses available upon request): **Marshal Wilder**, II; **Walter Farrell**, II; **Arnold Fedde**, II; **MacLean R. Brown**, VI; **Richard C. Molloy**, XVI; and **Frank Coyle** has moved back to New Orleans. Frank is the movingest man we have by far. That's it, and it is sure great to get together, even this way. A few remarks from the faithful would make it much greater. Always yours,—**Warren J. Henderson**, Secretary, Fort Rock Farm, Drawer H, Exeter, N.H. 03833

34

A letter from **Williams S. Matthews**: "The years have passed since I saw you at Sandia in 1958. Life has been good and every year its own bit of excitement. We had an addition to the family in '58, a boy Billy. His personality makes up for an aversion to school. Our daughter, Jane, is now 12 and a straight A student. When I saw you at Sandia, I was the Director of Operations at the Field Command of DASA, the joint DOD atomic weapons command. After four years there I was transferred to Washington as the atomic weapons specialist in the Air Force Intelligence Center. I was also the Air Force representative on the Joint Atomic Weapons Intelligence Committee and served through two exciting periods, of the Russian feats of 1961 and the Cuba crisis. In January 1963 I retired and went to work for an AEC contractor in San Antonio. After three and a half years there was a cut back, and I went into a period of actual retirement. This lasted one week, and then I decided to remodel the kitchen. I built new cabinets and ripped out everything to bare walls. I had everything replaced except at the last minute the range did not come because of a strike at General Electric, while for the next four months I built 700 feet of



G. Kingman Crosby, '34

stone wall. One day while Eleanor was still using a hot plate and muttering over a portable stove, I told her that I was going back to work. She was delighted and had been afraid that I would remodel the bedroom next. Now I am back to work for the government as an industrial engineer at Kelly Air Force Base. I am busy and happy, and my worst problem is Billy's arithmetic.

Bethlehem Steel Corporation recently announced the promotion of **Walton W. Hofmann** to Supervising Engineer, Construction. He graduated with a bachelor of science degree in metallurgy. He joined Bethlehem Steel as a member of that year's Loop Course, management training program for college graduates, and was assigned to the Johnstown, Pa., plant. At Johnstown Walt served in the metallurgical department in several capacities, including metallurgical assistant and assistant metallurgical engineer, then advanced to assistant superintendent of the lower works in 1940. He became assistant superintendent of the Franklin mills in 1949 and assistant chief engineer of the engineering division in 1952. In 1954 he was transferred to the West Coast as chief engineer of construction for Bethlehem's Pacific Coast operations. In April 1965 he was appointed chief project engineer, Pacific Coast operations, on Mr. Jacob's staff. He was appointed to his present position in June 1966. A certified professional engineer and a member of the Association of Iron and Steel Engineers, Walt resides at Saucon Valley Terrace. . . . **Art Conn** has made another technical address before the American Institute of Chemical Engineers.

Paul Wing, Jr., was appointed Manager of Export Sales for Worthington Controls, Norwood, Mass. In his new assignment Wing will be responsible for liaison with the associated companies of Worthington Controls overseas with respect to product details, application data, manufacturing drawings and the coordination of the company's activities in international business. In those areas of the world market where Worthington Controls Company does not have associated companies, Wing will manage sales through local agents and representatives and will be responsible for making recommendations for the development of overseas manufacturing facilities of Worthington Controls products in expanding and developing markets. Wing joined Worthington Controls Company in 1941 when it was then the Maseon Regulator Company. He progressed through a series of assignments in design and application engineering at Worthington, becoming manager of engineering and subsequently manager of product planning prior to this new post. Before joining Worthington Controls he was the head of the Instrument Department of the Universal Oil Products Company in Chicago. He is a member of the American Society of Mechanical Engineers and the Instrument Society of America. . . . **Larry Stein** reports that he had an interesting trip through England last year, spending



Walton W. Hofmann, '34 Paul Wing, Jr., '34

some time in the "potteries" area on business. His son is graduating from high school this year and going on to Worcester Polytech. . . . **Joseph Awramik, Jr.**, Course I, is Head, Satellite Communication Systems Section, Naval Electronic Systems Command, Baileys Crossroads, Va. 22041. His office was responsible for the design, development, and procurement of the Navy's shipboard satellite communication terminals which are shortly being installed on selected ships in the Navy.

King Crosby has been named Assistant Vice President of the International Nickel Company of Canada, Ltd., according to an announcement by Henry S. Wingate, Chairman of the Board. "Mr. Crosby will continue to serve as Vice President of the International Nickel Company, Inc. in New York. In his new position he will be concerned with International Nickel's overall administration management and salaried personnel activities." The announcement states that King "joined International Nickel in 1936 as a metallurgist in the company's Huntington Works in Huntington, W. Va. In 1937 he was made combustion engineer, and in 1942 he became assistant to the general manager. After holding various managerial positions in Huntington, he came to New York in 1962 as vice president of the Huntington Alloy Products Division. In 1966 he was also named vice president of the International Nickel Company, Inc. He is a member of the Broad Street Club, New York City; the Roton Point Beach Club, Rowayton, Conn.; the Wianno Club, Osterville, Mass.; and the Aqua Cat Sailing Association, Norwalk, Conn."

Announcement of the appointment of presidents of four divisions of Reeves Brothers, Inc., and reorganization of the finished goods executive team was made recently in New York by John E. Reeves, President of the Corporation. **Anthony N. Mooradian** was appointed President of the Finished Goods Division. Mr. Mooradian joined Reeves Brothers in 1956 as Merchandise Manager of Synthetic Fabrics of Pacific Mills, a division of Burlington Industries, Inc. He was named Vice President and General Manager of Reeves Finished Goods Division in 1961, and a Director in 1963.—**George G. Bull**, Assistant Secretary, Mid-Atlantic 4961 Allan Road, Washington, D.C. 20016; **W. Olmstead Wright**, Secretary, 1003 Howard St., Wheaton, Ill.; **James Eder**, Secretary,

1 Lockwood Road, Riverside, Conn.; **Norman B. Krim**, Secretary, 15 Fox Lane, Newton, Mass. 02159

35

Although **Ham Dow** has become a Vice President of the Class instead of Co-Secretary, it is to him that we are indebted for a great deal of the news in this month's Class notes. Herewith are excerpts from his several letters during the month, in more or less chronological order: "One bit of news I have is on a sad note. **Rufus Applegarth**, our Class Treasurer, lost his wife Margaret who died July 16 while they were vacationing in So. America! I have no real news of Californians. I did bump into **Leo Epstein** for a minute in the corridor; we plan to get together for a chat soon. While facts are fresh, I'm jotting down the notes of our Class representation at the Alumni Officers' Conference dinner in San Francisco last night, as I wait for the fellows to pick me up to play my office league tie-breaking match which I'll also use as my Class golf tourney score for my match with **Bob Anderson**. I didn't get back from S. F. until after 1:00 a.m. so I sure don't feel like I'll play like Jack Nicklaus today. Members of '35 attending the Conference were Bill Abramowitz, Randy Antonsen, Rufus Applegarth, Carbon Dubbs and Pete Grant. I went only for the dinner as a member of the host Northern California M.I.T. Club and to say hello to the fellows. No others from '35 showed up. Both Bill and Carbon brought their wives." You'll note, as I did while writing the Class notes, that the names are of the same classmates you regularly read about. How we get news about the others is the question. In talking with Rufus I learned a bit more of the tragic death of his wife Margaret last July. While they were on a tour of the Galapagos Islands, she became suddenly ill lapsing into a coma that appeared to be from a stroke or a thrombosis. Being some 700 miles from the nearest hospital, whatever could be done for her under the circumstances was done, but to no avail. Rufus is planning another trip to New Zealand and Antarctica in January."

Ham also sent along a letter from **Stocky Stockmayer**, part of which follows: "Here is just a short hello, inspired partly by receipt of **Al Mowatt's** Alumni Fund enclosure but also by a drop-in visit from Priscilla and **Jack Colby** whose eldest son Richard is at Dartmouth training a group of Peace Corps volunteers for service in Africa, where he has already put in two years since graduating from Yale. The Colbys are fine and soon are to head back to the Florida Keys for the winter. Sylvia and I had three months in Japan. Highlights included visiting professorships at two universities, Kyoto and the Tokyo Kyoiku University, climbing Fuji and in the Japan Alps, a week in Korea, a phone call to **Willie Dunn** while passing through Honolulu (he is fine and very busy with buildings construc-

tion), my first hard-baseball game in 30 years (with Japanese students in Tokyo), talking at an International Symposium in Tokyo (the real excuse for the whole trip). Has **H. S. Mason** ever favored you with a letter? He is a distinguished biochemist, Chairman of the Biochemistry Department at the University of Oregon Medical School (Portland), co-author of a book (1965) on a subject initiated by one of his own discoveries, *Oxidases and Related Redox Systems*. Hope your own new post is good! Look up **Leo Epstein** at Vallecitos GE Lab.—Co-Secretaries: **Phoenix N. Dangel**, 329 Park Street, West Roxbury, Mass. 02132; **Irving S. Banquer**, 20 Gordon Road, Waban, Mass. 02168

38

"SYMBOLS, a common system of communication which can be readily understood by farm and industrial equipment operators of all nations," is a study project for **Bill Purcell**. Bill is a partner in the Henry Dreyfuss Industrial Design organization, and as consultants to Deere and Company they were asked to develop a basic set of symbols, eventually to replace the written word, for farm and industrial equipment. International trade and the common markets, Bill noted in an article prepared for *Automotive Industries*, obviously require some solution to the language problems in labeling of controls, tabulation of operating instructions, and emphasizing of warnings! Sixty-one symbols selected in the first group use pictographs and abstracts to convey "Park," "Start," "Pressurized, Open Slowly," "Frequency of Grease Lubrication," "Raise and Lower Cotton Picker," and everything in between. The list was developed with coordination among many existing accepted symbols in the commercial nations, and both Bill and Deere hope the work will lead to international standardization. . . . SYMBOL Contest is hereby proclaimed for the 30th Reunion! If Bill can assemble 61 symbols for running a combine, how good are you at submitting a symbol appropriately (and uniquely) characterizing our 30th Reunion? Winning symbol will be offered to the Reunion Committee for use on correspondence, announcements, badges, and to the extent economically feasible on gifts and souvenirs! The winning creation will bring to its designer fame, an honorary title on the Class Executive Committee, and a free drink from the Class Secretary (this latter award, one sarcastic proofreader has noted, is rarer than the Nobel Prize)! You have the details for possible subliminal inclusion: June 7-9 at Chatham Bars Inn and June 10 at Cambridge; sports, diversions, and fetes; gemütlichkeit, reminiscence, and prospection; inspiration and revelation! Contest regulations are: (1) Entries must be submitted to the Class Secretary postmarked no later than January 10, 1968; (2) Entries must be accompanied by 25 words or more suitable for inclusion in the Class notes; (3) The panel of judges will be the most competent available, and there will be no appeal; (4)

All entries become the property of the Class of '38. Good luck in this the *Tenkoku* Tourney!

Bob Elliott reports that he is now with DAL Airlines in Dallas as a pilot. From the day he became a charter member of the M.I.T. Flying Club in 1936 Bob has been doing what he likes best, for the Air Force and for several airlines and charter services, in a happy combination of engineering and actual flying. "Our oldest daughter Roberta graduated from Arizona State University this year with the highest scholastic average in her class," Bob notes. Son Tommy is entering the University of Houston. There are three other daughters, Gretchen, Stella, and Elizabeth. And all the Elliott children have high musical interest and talent. . . . Ground tilt isolation has been investigated by **Ken Tsutsumi** in a research program at the M.I.T. Instrumentation Laboratory. Calibration of precision gyroscopes and accelerometers is complicated by random long-period ground tilts, which may occur at rates from several milliseconds of arc per minute to many seconds of arc per day, with up to ± 20 seconds of correction needed. Ken designed a geotilt recorder with a sensitivity of 2 mv/sec of arc, and developed an isolation test table hydraulically stabilized level within 0.2 sec of arc! Ken is a consultant to the Instrumentation Laboratory and also a professor at Tufts University. . . . **Arnie Kaulakis** has been re-elected a director of the JETS, Junior Engineering Technical Society. The objective of JETS is to provide technically-oriented high school students with the opportunity to experience the practice of engineering and other related technical careers before they make a choice of an educational program at the college level. There are more than 1000 JETS high school chapters, Arnie reports. Otherwise Arnie is responsible for Refining Coordination, Standard Oil Company (N.J.), and has been publishing provocative papers, such as "Appraisal of Creative Talent."

Competing with both the Misses Illinois for 1967 and 1966, **Yale Brozen** was the featured (?) speaker at the 75th anniversary luncheon of the Oak Park Trust and Savings Bank, Oak Park Illinois! Yale is Professor of Business Economics in the Graduate School of Business at the University of Chicago and has served as a consultant to the government as well as to AT&T and General Motors. . . . **George Heinemann** has been appointed Sales Manager of the Industrial and Commercial Controls Department of Controls Company of America in Schiller Park, Ill. George will direct the department's field sales, service and distributor organization which markets a variety of controls for the vending, office equipment and scientific apparatus, and automated industrial equipment industries. He was formerly sales manager of Distributor Products for the Electrical Products Division of Ferro Corporation, having left the advertising agency business because "someone is always pushing the panic button!" It is implied

that Controls Company has a suitably programmed and interlocked control preventing misuse of "panic," thereby permitting George to continue consulting as ex-Fire and ex-Police Commissioner of Palatine. . . . Elected Executive Vice President of Fafnir Bearing Company, **Frank Atwater** will now have responsibility for all of Fafnir's operations in New Britain, S.C., and abroad. Frank became vice president of operations in 1963 and a director in 1964. He is also a director of New Britain National Bank, and of Goss and DeLeeuw Company, Kensington. This has been cutting into his time for the Boy Scouts and the Board of Water Commissioners, but has kept him busy at the Shuttle Meadow Country Club.

Ash Shapiro has been elected a Fellow of the American Society of Mechanical Engineers, a distinguished grade conferred upon those ASME Members whose acknowledged engineering attainments and active practice in the profession total 25 or more years. Ash, as Head of the Institute's Department of Mechanical Engineering and Ford Professor, is a leading contender for the Member-of-the-Class-of-1938-with-the-most-media-coverage! Mechanical Engineering today is so vibrant that Ash says to his students, "A field of this width and diversification cannot be learned and mastered in all its details in four college years or even in a lifetime. The objective of our undergraduate program is to provide a broad intellectual horizon for the graduate and to inculcate such habits and skills of study that he will learn new science as it appears and take the initiative in applying it." . . . You need not wait to be contacted by the Reunion Committee. Many of you will by now have heard from friends about specific Reunion details, and the Committee under Chairman **Lou Bruneau** and President **Jack Bethel** is taking active aim at the rest. But you should feel perfectly free to take the initiative and organize your own associates into a Reunion delegation! Write to them about the *Tenkoku* Tourney. Strike now while the *Teppitsu* is hot. Collaborate perhaps in the SYMBOL Contest, but collaborate for sure in preserving June 7-10 from the mundane. Reunion will bring together the fellows you want to see—if you encourage them now to join you!—**Frederick J. Kolb, Jr.**, Secretary, 211 Oakridge Drive, Rochester, N.Y. 14617

39

Robert M. Toppin, II, has been promoted to General Manufacturing Manager of Fafnir Bearing Company, Hartford, Conn. Bob, previously group manufacturing manager, joined Fafnir in 1962 from Jacobs Manufacturing Company of West Hartford where he had been factory manager. He is a registered professional engineer and past president of the Hartford Chapter, American Society of Tool Engineers. . . . Lieutenant Governors enjoy frequent press coverage, especially

44 in their home state, and **Francis W. Sargent, IV**, is no exception. This time the *Haverhill Gazette* printed an address of his, delivered in the Merrimack Valley in conjunction with the opening of part of a new link of Interstate 495. Frank's theme was that industrial development can be a blessing to a community if proper planning insures that the inherent beauty of the area is not ruined by mere exploitation. . . . Another classmate in the service of the Commonwealth of Massachusetts, and very recently, is **Robert C. Casselman, XV**. At the invitation of Governor Volpe Bob has entered public service as a consultant for economic development. He is a member of a new planning and advisory group to do comprehensive planning for the state, developing improved organizational structures and helping coordinate federal programs within Massachusetts. Bob's office is in the new State Office Building at 100 Cambridge Street, Boston, Room 909. His phone is 727-4168. Virtually a full-time assignment, Bob still hopes to give occasional lectures at M.I.T.—**Oswald Stewart**, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017

40

Ted Kingsbury dropped your Secretary a note that he had been appointed Director of Development for the Unitarian Universalist Service Committee. This is an international agency, and Ted will be directing the national fund campaign. . . . Those who watched the ABC News Color Special "Take A Deep, Deadly Breath" on Television August 31, 1967, undoubtedly recognized **Arnold Arch** who is Executive Secretary of the Air Pollution Control Association and has long been a leader in the fight against air pollution. . . . **Chuck Goddard** gave a talk on "Recent Developments in Thin-Film Technology" for a recent meeting of the Winston-Salem Section of the Institute of Electrical and Electronic Engineers. Chuck is Head of the Film Component Department of Bell Laboratories in Allentown, Pa. With time out for four years in the Signal Corps, he has been with Bell Systems since his undergraduate days at Tech, first at Western Electric and then at the Merrimack Valley Laboratory in North Andover, Mass. Since 1961 he has been at the Allentown Laboratories where he was responsible for the development of masers, superconducting electromagnets, and refrigeration systems for the satellite ground station equipment at Andover, Maine. In 1965 he assumed responsibility for the development of thin-film integrated circuits. Chuck is the holder of 13 patents on electron tubes and devices.

Herb Hollomon, VIII, is the author of an article in the June, 1967, *Scientific American* on "The U.S. Patent System." Herb's article is a good summary of the working of the patent system and of the proposed new patent law. His

statement that the most significant change the bill could make would be the establishment of a first-to-file basis for awarding patents is objected to by a considerable majority of the patent profession. Your Secretary is in the minority who agree with Herb. . . . As a final note I am listing address changes of three classmates received during the past month: **Ray Keyes, XIII**, 1511 Goethals Drive, Richland, Wash. 99352; **Al Barton, X**, c/o Mrs. Howard R. Barton, 104 Wakefield Street, Hamden, Conn. 06514; **Clif Cracauer, V**, 224 W. Minnehaha Parkway, Minneapolis, Minn. 55419. If interest is expressed in receiving changes of address, this will be included as a regular feature in the column—**Alvin Gutttag**, Secretary, Cushman, Darby & Cushman, American Security Building, Washington, D.C. 20005

41

Irving J. Foote has been promoted to Director of Manufacturing for Coatings and Resins at the Glidden Company, Cleveland, Ohio. Irving has been with Glidden since 1946. Prior to his new post he was assistant director of manufacturing. . . . **Edward G. Sherburne, Jr.**, is featured for his work on public understanding of science in the summer 1967 issue of *Understanding*, a publication of the American Association for the Advancement of Science and Council for the Advancement of Science Writing. Ted is now heading up Science Service which published *Science News* (formerly *Science Newsletter*), a weekly magazine with international coverage on science; Syndicate Service which provides daily, by mail, syndicate service stories on science to U.S. and foreign newspapers and magazines; and Science Fairs which through the International Science Fair is affiliated with most of the local, state and regional Science Fairs for young people throughout the country. Ted is a former director of the American Association for the Advancement of Science public understanding of science enterprise. . . . **Robert L. Sinsheimer** has been elected to the National Academy of Sciences. Robert is noted for his work in genetics. He discovered the first organism known to have single-stranded DNA and the ring-shaped structure of the virus ϕ X174. He has also made significant contributions in the field of chemical analysis of genetic material by the determination of nucleotide sequence. He is a Professor of Biophysics at Caltech where he has been teaching since 1953.

William R. Mason, President of the Irvine Company, real estate developers of the 85,000 acre Irvine Ranch property in Orange County, Calif., was principal speaker at the annual meeting of the Home Builders Association of Los Angeles. Bill joined the firm in 1949 as administrative engineer. He became vice president in charge of en-

gineering in 1963. In 1965 he was promoted to vice president in charge of the land development division and was elected president in June 1966. He was chief engineer for Arcadia Metal Products, Fullerton, Calif., from 1956 to 1959. Previous to that he was division director of amphibious construction for the Navy laboratory at Port Hueneme, Calif., and from 1946 to 1951 was assistant professor of civil engineering at the University of Washington.—**Walter J. Kreske**, Secretary, 53 State Street, Boston, Mass.; **Everett R. Ackerson**, Assistant Secretary, 16 Vernon Street, South Braintree, Mass.; **Michael Driscoll**, Assistant Secretary, 63 Centre Street, Nantucket Mass.

42

Here's a more complete account of the 25th Reunion, courtesy of a long and newsy letter from **Lou Rosenblum**. "Let us see if we can convey in words a bit of the atmosphere of the grand time that some 250 of us had at our 25th Reunion. The 250 included 87 alumni. There were 75 wives and 88 children of various ages from 6 to more than 21 years. The highlights of the Saturday program were the garden reception of President and Mrs. Howard Johnson, lunch with more than 100 well preserved faculty under whom we studied and sometimes learned, and then our evening dinner dance at the Faculty Club. The Saturday program also included tours of many new facilities at the Institute and discussions of exciting new work including major advances in the control of artificial limbs, communications satellites, and a presentation by Dr. Edgerton of his recent underwater archeological explorations. . . . On Sunday we bussed in large groups to Sturbridge for a sumptuous buffet at the Public House punctuated by tours of historic old Sturbridge Village, golf for the early risers, softball for the sturdy, and dips in a local swimming hole. **Ron Shanin** was the feature attraction of Sunday evening. Kresge Hall at M.I.T. was filled and enthralled by *Rivers of Fire and Ice*, a two-hour color and sound professional exhibition movie of his exploring, wild animal capturing, and adventures in darkest Central Africa. Ron's improvisations in truck repair and aplomb in the handling of dangerous snakes and lions were exciting accompaniments to his colorful and artistic movies of volcanoes and glaciers. . . . By Monday noon our good luck with warm, dry weather ran out, but the pleasure of gathering at M.I.T. continued throughout the Alumni luncheon, staff seminars and evening banquet.

The *New York Times* of September 25 reports the appointment of **Ed Vetter** as Group Vice President for Materials and Services of Texas Instruments. . . . **Tom Gleeson** who is at Florida State University in Tallahassee writing in the *Journal of Applied Meteorology* is quoted

as saying that "... precise long range predictions of weather are out of the question, or at least unlikely. . . In the long run, the limit for 'deterministic probability' in weather forecasting is about two weeks in the winter and somewhat longer in the summer." Matter of fact, looking at some of the TV weather forecasting in the N.Y.C. area, I wonder if it is that good! . . . From *Army Research and Development Newsmagazine* we learned that **John Whitman** has been assigned to the Nike-X System Office in the Office of the Chief of R & D, Department of the Army. . . . Nary a letter this month except for Lou Rosenblum's, how about some news from you all?—**Ken Rosett**, Secretary, 191 Albemarle Road, White Plains, N. Y. 10605

44

James M. Mavor, Jr., XIII, of the Woods Hole Oceanographic Institution, has received world-wide recognition for his leading role in the discovery of a complete 3500 year old Minoan city buried on the Greek volcanic island of Thira in the Aegean Sea. The discovery was announced to the press on July 18 at the Boston Museum of Fine Arts which helped support the exploration. After receiving in mid-August a clipping from the Boston Sunday *Globe* of July 23 and an article from *Time* magazine in the issue of July 28, I was able to find the story which had appeared on the front page of the *Washington Post* the day after the July 18 announcement, thus confirming the *Globe* statement that the announcement had created a national stir. The article in the July 28 *Time* magazine under "Archaeology" made clear Jim's leading role. In 1965 Jim met Angelos Galanopoulos, Professor of Seismology at the University of Athens. Galanopoulos told Jim about the philosopher Plato's account of the Greek legend of Atlantis and the possible link between that legend and the end of Minoan civilization on Crete because of a giant volcanic explosion that blew much of Thira away. Seismologist Galanopoulos theorized that Plato misread by a factor of 10 the dimensions of Atlantis and the date of its destruction given in an Egyptian manuscript. In 1966 Jim



Norman I. Sebell, '44 (right), President of Ferrerflex Corporation of America, Nashua, N. H., and Mrs. Sebell (second from the left) were among more than 150 members of the Smaller Business Association of New England at the Association's 1967 annual outing at the squantum Club, East Providence, R.I., this summer.

sailed to Thira in the research vessel *Chain of the Woods Hole Institution* and obtained seismic profiles of the island. When these profiles showed conformations that seemed to match Plato's description, Jim organized a full-fledged expedition for this year. Following this year's discovery, Jim is back in the U.S. to organize a 10-year, \$1,000,000 excavation to begin in June 1968. Undoubtedly we will be hearing much more about this major find and the possible solution of the 2700-year-old mystery of Plato's account of the legend of Atlantis.

Let's look at some of the other news.

James A. Neff, XV, Birmingham, Mich., has been elected President of MAC Valves, Inc., manufacturers of air control valves for industry, according to the item which appeared in the March 9 Birmingham (Mich.) *Eccentric*. Jim, who has been with the company since 1959, was executive vice president prior to the recent election. . . . **James J. St. Germain**, XVI, was appointed Chief Engineer for Regional Construction and Maintenance at American Oil Company as reported in a press release dated April 7 from the Chicago office of American Oil. . . . **Robert Meltzer** now heads the new Special Products Division of Bausch and Lomb in Rochester, N. Y., according to a press release dated April 26. The new division was established to provide rapid response to special manufacturing and marketing opportunities, especially in the fields of thin films, photographic, photogrammetric, and military products. The new division which Bob heads will be responsible for its own research and development, engineering, manufacturing, and marketing in the above product areas. The announcement of the regrouping and the appointment was made by another classmate, **Corwin Brumley**, VIII, Vice President for Research and development. . . . **Edward B. Walker**, formerly exploration coordinator for Gulf Eastern Company in London, has been named Director of the Exploration Division of Gulf Research and Development Company in Mar-Marville, Pa., according to a press release from Gulf Oil Corporation, Pittsburgh, Pa., dated May 22.

Nicholas J. Grant, III, Sc.D., of Winchester, Mass., has been elected to the Board of Directors of the Loomis-Sayles Mutual Fund, according to a press release of about May. Nicholas is a Professor of Metallurgy at M.I.T. He had been scientific advisor to Loomis-Sayles & Company, Research Department, for the past several years. . . . According to a press release of June 6 Amicon Corporation of Cambridge, Mass., and Dorr-Oliver, Inc., have instituted a joint program for cross-licensing and full exchange of technical information relating to the development and application of membrane technology for ultrafiltration and reverse osmosis. Amicon was founded five years ago by **Alan S. Michaels**, X, X-A, S.M., X, Sc.D., then professor of chemical engineering

at M.I.T. . . . **J. Ross MacDonald**, VI, S.B., S.M., Director of Corporate Research and Engineering at Texas Instruments, Inc., has earned his second doctoral degree from Oxford University, according to a press release from Dallas, Texas, dated June 23. In 1950 Ross earned a doctor of philosophy degree in natural philosophy (physics) after attending Oxford as a Rhodes Scholar from Mass. In June he was awarded a doctor of science degree in recognition of his work in a wide variety of areas of physics and electronics. He has published 86 technical papers in 35 different scientific and engineering journals and has been issued 10 U.S. patents. . . . **Richard C. Grant**, XV, was promoted, effective July 1, to the new position of Northeastern Regional Manager of United States Envelope, according to a press release of June 27. In the newly created position Dick will have complete responsibility for sales, sales service, and manufacturing in the New England, New York, and middle Atlantic states. USE plants in Springfield and Worcester, Mass., and in Enfield and Rockville, Conn., will be under his direction. The Springfield (Mass.) *News* carried the story with picture on June 27 followed by the Hartford (Conn.) *Times* on July 3. Dick joined USE in 1964 as production engineer and production analyst on the corporate production staff. His initial assignment was planning and organization for a new company plant which opened in Williamsburg, Pa., later that year. In June 1964 he was appointed Williamsburg plant manager. In 1966 he was promoted to northeastern regional production manager with responsibility for all production activities in USE plants located in Springfield and Worcester, Mass., and Rockville Conn. (see Class notes for November 1966 and April 1967).

A. Donald Arsem, VI, was advanced from Vice President to Senior Vice President of the Wurlitzer Company, maker of musical instruments, according to "Who's News" in the *Wall Street Journal* of June 28. . . . **Palmer P. Derby**, VI, has been elected Vice President of the Raytheon Company according to "Faces" in *New England Business* for July. Palmer was assistant general manager of the company's Microwave and Power Tube Division. . . . **Cortlandt F. Ames**, XVI, has been appointed Director of Planning of Lone Star Cement Corporation, according to a press release from New York dated September 5. In the newly created position Cortlandt will coordinate the corporation's planning for growth and diversification. Cort joined Lone Star in 1963 after eight years of management counseling work with McKinsey & Company. In activity for the alma mater he is an Educational Councilor in New York City. . . . **Caleb S. Taft**, Course II, Bloomfield Hills, Mich., has been appointed Assistant to the President of Internal Silver Company, according to an article with Caleb's picture which appeared in the September 13 issue of the *American Metal Market*. In his new position Caleb assumes respon-

sibilities connected with International's Midwestern subsidiary operations. The clipping was sent to me by **Paul M. Heilman** who also writes, "Now that summer is over, I can say that the Heilman clan had a fine trip for our summer vacation. I had to be in Mexico City on business so I took the family. I did the tourist trips between business sessions so it was somewhat abbreviated. However Mardi, my wife, and Maritza, my daughter, both improved their Spanish and enjoyed the trip. Young Paul became a rock hound, and it was only with the greatest of persuasion that he didn't bring back 50 pounds of samples." Paul also reports that he met **John E. Fries, Jr., III, S.B., S.M.**, earlier on a New Haven Railroad train. Jeff is Vice President and General Manager of Nutmeg Steel Castings, Branford, Conn. Jeff moved from Mahwah, N.J., (American Brake Shoe Company) where he was First Selectman. He would like to return to politics, but he is too busy with steel castings.

Will B. Rodemann, VI, S.B., VI-A, S.M., has furnished me his new address: 150 Erica Way, Menlo Park, Calif. 94205, and stated that he has a new job as Director of Corporate Marketing for Varian Associates. . . . **Edward M. Coan, VI, S.B.**, wrote September 18, "I am in Australia working on Satellite Communications with RCA. The two oldest children are starting college back in the U.S. The other three are here learning rugby and cricket. My wife Barbara is active in art, painting, and teaching. It's a great life down under with kangaroos and kaolas." . . . I also received notes from **Laurence E. Dowd**, Arlington Heights, Ill., and **Ray C. Frodey**, Fremont, Mich., which I shall hold until next month. . . . Time to wish all of you a merry Christmas and season's greetings for the New Year even though Halloween is still three weeks away. Your secretariat would like to suggest that you exchange greetings with a few of your schoolmates and pass along a few interesting items of information which may thereby be uncovered.—**Paul M. Robinson, Jr.**, Secretary, Information Systems Branch, Office of the Chief of Naval Operations (Op-90F), Pentagon 5E773, Washington, D.C. 20350, 202-697-0264, or 7710 Jansen Dr., Springfield, Va. 22150, 703-451-8580; Assistant Secretaries: **Paul M. Heilman**, 2d, Copper Development Association, 405 Lexington, Ave., New York, N.Y. 10017, 212-687-6500, or 30 Ellery Lane, Westport, Conn. 06880, 203-227-3469; and **John G. Barmby**, IIT Research Institute, 1200 17th St., N.W., Washington, D.C. 20036, 202-296-1610

47

Your thoughts are probably involved with Thanksgiving as you read this, but as I write I am sitting in Cleveland on a cold dreary day with one eye on the TV set watching my old Red Sox battle the Twins. This diversion may make these notes most disjointed, but for me its

now or never since next week Gina and I are combining some business and pleasure with a little golf at French Lick, Ind. . . . Last month I neglected to mention Alumni Day which was attended from our Class by Claude Brenner, J. Cardoso, Morgan and Daphne Cooper, Robert Danner, Hugh Flornenhof, Morton Loewenthal. Fred Heuchling was with one of his sons. They were doing a bit of campus checking in the East. As I recall neither hometown Wooster, Ohio, not M.I.T. appeared to be the answer. Also present were Ken and Lois Marshall, Ed and Lillian Meisner, Dick and Betsy Mooney with their girls, Jack and Karen Rizika, Jim and Dorothy Robertson, Parker Symmes, Jim Phillips and Paul de Mello. This year Alumni Day included what I feel was a new and interesting innovation, several seminars. One had a choice of about six courses with essentially three hours of classroom in the morning and two in the afternoon. The Mooney group, **Paul de Mello**, Gina and I attended one on stock prices and corporate financial policy. We found that the present economic thinking, at least as expressed in this Class, is not as conservative as it was 20 years ago in the same classroom under Professor Tucker. **Jim Phillips** had praise for the other Course XV seminar, and the Coopers spoke highly of a Course VI offering, so all in all I gathered that the program was well received.

Some of you have taken the time to drop a line so will pass this information on to all: **Henry J. Sandler** and family recently returned from three years in France and are again residing in Philadelphia. . . . **Robert Blount** remains as commanding officer of the Polaris submarine *U.S.S. Patrick Henry*. . . . **Michael Daly** after receiving his LLB degree from the University of Connecticut in 1957 opened his law office in Waterbury where in general practice he tries at times to lean toward engineering and construction work. . . . **Eugene Wejman** writes that the graduation of his oldest daughter from the Emma Willard School in Troy precluded his attending the Class Reunion but that he did have a get-together with **Harl Aldrich** at the Assembly Ball. . . . From the clipping services we have quite a few promotions and job changes, some of which are as follows: **C. Fred Brodersen** has left the University of Michigan and is now Director, Department of Public Interest, at Columbia-Presbyterian Medical Center and Director of Public Relations for Columbia University's College of Physicians and Surgeons. That would seem to be quite a mouthful to put on a calling card, but Fred's experience at Michigan and for many years in industry should enable him to do well in this new endeavor. . . . **L.C. Oberholtzer** of Vienna, W. Va., is now Manager of Appliance Development with Marbin Chemical Division of Borg Warner.

Have saved until last what is probably my most important communique, a letter

from **Dick Mooney** most of which I will quote: "I had a wonderful time at the Class Reunion, and it was good to see you and the other classmates. I really thought that those of us who attended the reunion looked 20 years younger rather than a day older. I know that you have taken on the job of Class Secretary which certainly takes time out of an already busy life. As you know, I have taken on Chairmanship of the 25-Year Reunion Gift for our Class. With this responsibility I could use all the help that everyone can give me. Accordingly, could you inject into the Class notes the fact that I am Chairman and that I will need the help and support that each one of the Class can give to me. Our 25th Reunion will be in June 1972 at Alumni Day. At this time our Class will present its 25-Year Gift. Traditionally, this is the year when the Class presents its first major gift. It is the total of all gifts to M.I.T. by members of our Class for the five years commencing with this past July 1967. In other words, when we give to the Alumni Fund, we are also giving for our Class 25th Reunion Gift. In October 1967 I will hold two meetings with classmates in the New York and Boston area. At that time we will establish goals and appoint area chairmen. Then we will have to work on a strategy to run a successful campaign." . . . This pretty clearly explains the start of our five-year program, and undoubtedly you will be hearing more on this subject direct from Dick and at times in this column. That's it for this month. Drop us a note.—**Dick O'Donnell**, Secretary, 28516 Lincoln Road, Bay Village, Ohio 44140; **Arnold Varner**, Harvey Hubbell Company, Newtown, Conn.



J. Ross MacDonald, '44 F. W. Smith, '49

49

Harvey C. Travers, S.M. '49, has been appointed a Senior Sales Associate by the Corning Glass Works of Corning, N.Y., in recognition of his outstanding record since joining the company in 1950. Because of his work in Pyrex brand drainline sales he has been granted the title of Associate Plumbing Inspector in the New England Association of Plumbing Inspectors. Harvey is a member of the American Institute of Chemical Engineers and Tau Beta Pi. . . . **F. W. Smith, SCD '49**, has been elected a Vice President of Mine Safety Appliances Company, Pittsburg. He is Director of Research and Engineering with MSA which he joined in 1963. Prior to receiving his doctorate, he was for six

years a research associate specializing in gas turbine combustion research at M.I.T. Dr. Smith is a member of the American Chemical Society, the Society of Automotive Engineers, the American Institute of Mining, Metallurgical and Petroleum Engineers, the New York Academy of Science, the Chemists' Club of New York and the American Institute of Chemical Engineers. . . .

David Tod has been named a Vice President of the Ohio investment securities company of Merrill, Turben & Co., Inc. He is manager of the Youngstown office of the company.

. . . **John B. Donner** is Manager of Marketing for Sylvania's Information Systems Organization in Needham, Mass. Back in April John was one of three experts who spoke before the New England Purchasing Agents Association on the relationship between purchasing and marketing functions. . . . **Charlie Jordan**, who has been in charge of exterior design of all General Motors cars and trucks for the past five years, has been transferred to GM's Opel affiliate in Russelsheim, West Germany. Charlie reports to GM Styling Vice President **William Mitchell**. . . . A cryptic card from **Charles Davis** to **Ken Brock** and forwarded to me speaks volumes for a way of life. I quote: "Sold my partnership. Bought a Clark Cortez Motor Home in Los Angeles. Expect to leave soon (card was dated July 24, 1967) for Vancouver, Banff Yellowstone, Expo and freighter to Europe in November, possibly to Japan in one year and back to school two years from now if nothing more interesting turns up. Hope to attend Food Tech seminar at beginning of October in Cambridge if possible. Wife and two kids with me all the way."

A method of eliminating the joints from railroad rails by welding them in place has been patented by **Clyde M. Adams, Jr.**, of the Institute Faculty. Welded rails are increasingly interesting to the railroads because the traditional jointed tracks, which cause the train's familiar clickety-clack sound, are a major cause of track breakdown. New track presently being laid is welded in quarter-mile long sections ahead of time and hauled to location in long trains, but this process is a lot of trouble. Besides, this doesn't help the millions of miles of track already in service. Dr. Adams says that his tests show a poor weld is better than a very good mechanical joint. . . . I am indebted to Professor Emeritus John B. Babcock, '10, for calling attention to the appointment of **A. Scheffer Lang** as Administrator of the Federal Railroad Administration in the new federal Department of Transportation. He was formerly Deputy Undersecretary of Transportation for Research, U.S. Department of Commerce. He also had been Assistant Professor of Transportation Engineering at M.I.T. From 1962 to 1965 he was director of operating data systems with the New York Central Railroad. . . . Also in railroading news, **Thomas J. Lamphier** has been appointed

Vice President Administrator in the Executive Department of the Great Northern Railway whose head offices are in St. Paul, Minn. Tom will direct the railway's computerization program and its constantly changing application to all phases of Great Northern's operations. He joined the road in 1949 and had been identified with electronic data processing and economic research prior to his election as a Vice President. . . . **Earl W. Eames, Jr.**, is now President of the Council for International Progress in Management. Back in January I had reported Earl's arrival at the Vice Presidential level in the organization.—**Fletcher Eaton**, Secretary, 42 Perry Drive, Needham, Mass. 02192

51

Again we regret that our notes are introduced with sadness. **Anthony P. Winfisky** passed away in September. He was 43 years old and was an Associate Professor in art education at Salem State College, Salem, Mass. Although Tony did not graduate with us (he transferred to the Massachusetts College of Arts for his bachelor's degree

and received a master's degree from Tufts), he was a frequent contributor to our Class notes and was interested in our activities. At the time of his death he had been completing his doctorate studies at Boston University. He was past president of the Danvers Historical Society and a member of several historical and professional societies. Our sympathy goes out to his wife, Alyce, his children, Anthony Jr., Jonathan and Leslie, and to his surviving brother and sisters. . . . **Chuck Baker** works for the Rand Corporation and lives in Pacific Palisades, Calif., with his wife Alice and their two children, Chip 6 and Cindy 5. . . . Charlotte and **George Blondin** live in Sacramento where George is an Analog Systems Engineer for the California Department of Water Resources. . . . The Director of Planning for the Ogden City Corporation is our **Owen Burnham** who resides in Ogden City, Utah, with his wife Colleen and nine children, Bruce 19, Debra 18, Roger 15, Constance 13, Scott 11, David 8, Arlene 6, Richard 4 and Melissa 2. Owen must be in charge of planning large projects! . . . On April 27, 1967, **Mortimer M. Elkind** received the E. O. Lawrence Memorial Award



Standing with his back nearest the camera is Robert C. Cowen, '49, author of *Technology Review's* "Science Review," linking a sociable circle of science writers at the banquet of M.I.T.'s international conference on single-cell proteins (see *Trend of Affairs*, page 46) this fall. Clockwise around the circle from Mr. Cowen are Peter Gwynne, Managing Editor of *Technology Review*; Mr. and Mrs. John Lannan (he is Science Editor of the *Boston Herald*); Mrs. Cowen; and Lord and Lady Richie-Calder of the University of Edinburgh. Lord Richie-Calder, who is himself a distinguished science writer, was the guest of honor at the banquet.

from the Atomic Energy Commission for his outstanding contributions to radiobiology and the understanding of cellular recovery from radiation injury. Along with a gold medal and citation he received a \$5,000 check. . . . **Merton C. Flemings** has developed an aluminum alloy called ST-60 which is being considered in the Norair Project of the U.S. Air Force. The project is to evaluate premium quality aluminum alloy castings for such applications as wing spars. Mert is an authority on aluminum casting and has published an article in *Modern Castings* on "Dendrite Arm Spacing and Solidification Time in a Cast Aluminum-Copper Alloy." . . . **Murray Gell-Mann** is the first man to hold the Robert Andrews Millikan Professorship in Physics at the California Institute of Technology. Murray, his English born wife and their two children live in Altadena, Calif. . . . **J. C. Hiester**, wife Caroline, Andy 10 and Mary 8 are living in Baltimore. . . . **Michael Kesler** has been promoted to Senior Advisor at Esso Mathematics and Systems Inc., a subsidiary of Standard Oil Company of N.J. As Senior Advisor Mike will advise the head of the Engineering and Science Applications Department on the technical content and direction of the work in the department.

Wilbur Leventer is living in Potomac, Md., with his wife, two sons and a daughter. He works for a building firm in Washington, D.C. . . . **Dave Long** works for Hughes Aircraft Company, Missile Systems Division, Advanced Projects Laboratory in Canoga Park, Calif. He and wife Chris have a 24-year-old son Steve. . . . Eleanor and **Paul McInnes** live in Hanover, Mass., with their four children, Pamela 15, Sheila 14, Paul 13 and Stephen 10. . . . **A. B. Metzner**, Professor of Chemical Engineering at the University of Delaware, co-authored an article in *Chemical Engineering Progress* on "The Behavior of Viscoelastic Materials in Short Time Processes." He was a recipient of the Junior Award of the America Institute of Chemical Engineers. . . . **Ed Monz** lives in Brighton, Mass., and is doing structural design work on multi-storied buildings for Hoyle Doran and Berry in Boston. . . . **Richard Packard** is Chief of Solid State Radiation Detectors at Melpar Space Science Laboratory in Natick, Mass. He lives in Brighton with wife Lola, daughter Melissa Joyce 16 and son Richard, Jr., 13. . . . **Orlo A. Powell, Jr.**, has been promoted to Associate Professor in Mechanical Engineering at the University of Hartford. Orlo and Nancy live in Wethersfield, Conn., with their three children Allen, John and Mary. . . . **Herb Scher** has been appointed Vice President, Technical Manager, and a member of the Management Committee of the Nevamar Company. He has been with the company since 1953. . . . **John J. Singer** has been appointed Research Director, Flushed Colors, for the Holland-Suco Color Company, a subsidiary of Chemetron Corporation. John and Marie live in Holland, Mich., with their three children.

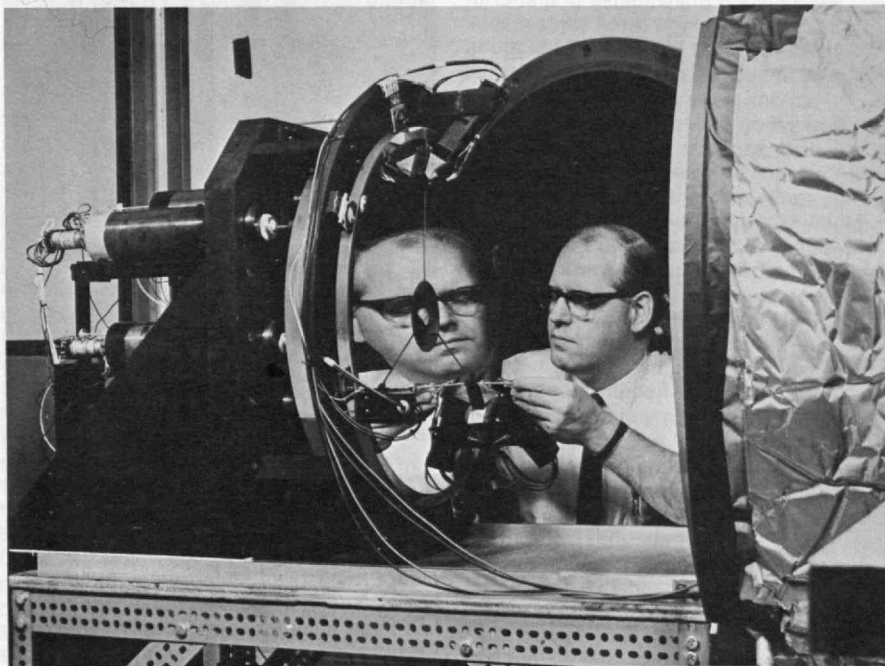


John P. Brady, '52

. . . **Ed Thompson** is a retired captain of the U.S. Coast Guard and lives in Falmouth, Mass., with wife Marion. They have three children, Paul 28, Stephanie 24 and William 20. . . . **Herb Voelcker** has been awarded a North Atlantic Treaty Organization Post doctoral Fellowship and will attend the Imperial College of Science and Technology, England. . . . **P. T. Woo** works at Chevron Research Company in LaHabra, Calif. He lives in Brea with wife Helen and daughters, Betty 8 and Andrea 6. . . . And since this is the season, we all want to include our greetings for a happy holiday. The notes were brought to you this month by **Walter O. Davis**, Assistant Secretary, 346 Forest Avenue, Brockton, Mass. 02401; **Howard L. Livingston**, Secretary, 358 Emerson Road, Lexington, Mass. 02173; Assistant Secretaries, **Mickey Alper**, 1130 Coronet Avenue, Pasadena, Calif. 91107, and **Paul Smith**, 11 Old Farm Road, No. Caldwell, N.J. 07006

52

Greetings for the coming year. A full mailbox for a change and so on with it. **Nicholas Melissas**, formerly Assistant to the President at Thomson Rivet and Machine Company in Waltham, Mass., has been named Vice President of Sales and Marketing having been with Thomson for five years. Nick and Jackie are still living in Newton, Mass. . . . **Richard E. Cole**, Manager of the Reynolds Metals Company Listerhill Reduction Plant at Sheffield, Ala., has been promoted to Reduction Division Manager for Reynolds and will be based at corporate headquarters in Richmond, Va. . . . **John P. Brady** has been appointed Vice President of Engineering by the John Fluke Manufacturing Company, a Seattle based electronic firm specializing in precision electronic measurement and calibration instruments. John had previously been with the Sanborn Division of the Hewlett-Packard Corporation where he was Engineering Section Manager. . . . **Russell Olive** received his doctor of business administration from Harvard University in June and is now in Manila, Philippines, having received an appointment as Visiting Associate Professor of Business Administration from the Business School. He is a Project Consultant to the Inter-University Program for Graduate Business Education in the Philippines. . . . **James Margolis** has founded Computer Aides, a group that provides systems and programming services to industry. Jim also keeps busy with Margolis Marketing and Research Corporation of White Plains, N.Y., which has dealt with plastic and general industrial



Perkin-Elmer Corporation engineers have developed a new technique for remotely positioning segments of a composite mirror which is viewed as a "major breakthrough" in U.S. efforts to achieve a large earth-orbiting astronomical telescope. Hugh J. Robertson, '52, is

shown making final adjustments on the three-segment prototype mirror; alignment of its segments to a tolerance of less than one millionth of an inch is accomplished with sensing devices, electronic controls, and actuators for each mirror segment.

Reduced Travel Rates FOR M.I.T. ALUMNI



Tours to the
Orient,
India

For details
see page 112

marketing since Jim founded it in 1958.

Bob Briber has been appointed Manager of the thermosetting polymer development operation of General Electric's Insulating Materials Department and is now in Schenectady, N.Y., having formerly been manager of the Paint Product Development Section with G.E. in Chelsea, Mass. . . . A nice letter from **Bob Henderson** says that he is now Campus Architect at the University of California at Santa Barbara helping enlarge the campus. He was married in 1965 to Louise Morse of Santa Barbara. Spare time is spent as the coach of U.C.S.B. sailing team and in building a 34-foot trimaran. . . . **Nathan Sivin**, now teaching at M.I.T., will be the author of the first book in a new series, the Harvard Studies in the History of Science by Harvard University Press. The title will be *Preliminary Studies in Chinese Alchemy*. . . . **William T. Dacey** has been named Director, Group Marketing, by New England Mutual Life Insurance Company, moving up from Group Marketing Manager. . . . **Dirk Plummer** married Janis Lowery in Haddonfield, N.J., in February 1967. . . . **John P. Lynch, Jr.**, has been appointed Manager, Anaconda American Brass Company, Waterbury, Conn. . . . Reliance Electric Company announced the promotion of **Herbert Dessner** as Manager of Engineering in the Systems Department in Cleveland, Ohio. . . . Reunion seems a long way back, and it is difficult to think that we have been out for over 15 years. Will try to catch up on a quick run-down of who was doing what in the next column when there is more space.—**Dana M. Ferguson**, Secretary, Box 233 Acton, Mass.



Richard E. Cole, '52

54

Geoffrey Hill has been appointed Associate Professor of Meteorology at the Lowell Technological Institute. Geoffrey has been a senior scientist with Avco Corporation and most recently was an atmospheric physicist at the Air Force Cambridge Research Laboratories engaged in research in dynamic meteorology. . . . **Paul E. Gray** has published a textbook entitled *Introduction to Electronics* which fills the need for a trans-

itional text between the usual first course in passive circuit theory and advanced undergraduate courses in electronics. . . . Another classmate devoting his energies to education is **Frederick West**, Assistant Professor of Astronomy at the University of Florida. Fred teaches descriptive astronomy and is planning equipment of a new observatory to be built around a 30-inch reflector. Dr. West, who enjoys birdwatching, resides in Gainesville, Fla., with wife Patricia, son Charles Newton and daughter Amy Brooke. . . . **John McNeilly** was lauded for outstanding scientific ability, perserverance and unselfish devotion to duty at Edgewood Arsenal in Maryland where he received an official commendation this summer. He is Chief of the Radiation Measurements Division of the Army's Nuclear Defense Laboratory. . . . Professor **William B. Kehl** participated in the American Newspaper Publishers Conference held in Kansas City, Mo., last June. . . .

Anthony Romano has formed a company to manage the development of the downtown Springfield, Mass., \$35 million Baystate West project scheduled for completion in 1971-72. The firm has been retained by the Massachusetts Mutual Life Insurance Company to operate Baystate West in cooperation with the insurance firm's own real estate department. . . . Major **Joseph P. Goncz** has been assigned to duty at Sandia Base, New Mexico, as Project Officer, Thermal Branch of the Defense Atomic Support Agency's Test Command. He had been serving in Seoul, Korea. . . .

Eugene A. Leary has been named an Assistant Professor of Mechanical Engineering at Union College in Schenectady, N.Y. Dr. Leary left a post at R.P.I. . . . If some of this news is a little outdated, I'm still working on a summer collection of clipping data. Any fresh correspondence would be appreciated; maybe your holiday correspondence will provide some Class news. Merry Christmas.—**E. David Howes, Jr.**, Secretary, Box 66 Carlisle, Mass. 01741

56

We have just received word that **Tuure Wirkki** was killed in a tragic accident last May near his home in Connecticut. Tuure leaves his wife Nancy and three small children, a boy age 5 and two girls age 4 and 2. Tuure came to Tech from upper New York and lived at the Student House. He participated in the Air Force ROTC, student professional societies, TCA and other activities. Tuure was absent from Tech for a brief period but returned to receive his degree in mechanical engineering in February 1958. Thereafter he moved to Hartford where he worked at Terry Steam Turbine Company, Royal McBee, Hamilton Standard, Skinner Precision Industries and Veeder Root. We shall all remember Tuure as a loyal and sincere classmate. . . . **Larry Blodgett** can be found at Ciba Pipe Systems in Burkburnett, Texas. . . . **Russell Cox** is attending the 14th session of the middle

management program at the Harvard Business School. . . . **Gerry Diamond** is now with Electronics International in San Francisco. . . . I managed to stop in to see **Walt Frey** in New York on September 21. Unfortunately, it was just an hour after another one of his successful Class luncheons, this one at the Flight Deck Club in the Pan Am Building. Contact Walt at Pan Am for more information on these events.

Julie and **Joe Huber** report the arrival of a son, Joseph McMillen, on September 5. . . . After reporting last month that architect **Ron Kiaer** was with Sid Luckman Associates, we find that Ron has recently started his own firm, Ronald Jensen Kiaer and Associates, Oakland Gardens, N.Y. . . . Dr. **George Luhmann** is now in his second year of residency in psychiatry at the Psychiatric Institute in New York. . . . Major **Thomas Nelson** has a new address, 1st Cavalry Division, APO, San Francisco—an impersonal way of saying Vietnam. . . . **Bill Northfield** has recently become Production Manager at Analog Devices in Cambridge. . . . Major **Guy Schmidt** has begun a 10-month course at the Army Command and General Staff College, Ft. Leavenworth. Guy had been Chief of the Plans and Management Office at the Springfield, Mass., Armory where he received the Army Recommendation Medal for his work. Before that assignment he had been assigned to Joint Research and Text Activity in Vietnam. . . . **Paul Walter** is now teaching chemistry at Skidmore College in Saratoga Springs. . . . Dr. **McIver Edwards** is back at the Department of Physiology at the University of Pennsylvania Medical School.—**Bruce B. Bredehoff**, 16 Millbrook Road, Westwood, Mass. 02090; **T. Guy Spencer, Jr.**, M.I.T., Room E19-439, Cambridge, Mass. 02139, Co-Secretaries

57

Due to a slight mix-up the names of those attending the reunion at Jug End Barn were not included in the last issue as I had planned, so here is the complete list provided by **Mal Jones**: Bill and Janet Alcorn, Richard and Betsy Baird, George Beerli, Larry and Alice Berger, Art and Penny Bergles, Andrew and Jeannemarie Blackman, Eugene and Joan Bloch, Lee Bredbenner, Mike and Jean Brose, Ralph and Barbara Brown, Allen and Penny Burgess, Jules and Elaine Byron, Paul and Karim Carr, Joe and Jane Carty, Ben and Barbara Chertock, Ed and Maria Crowley, Jim and Anne Cunningham, John and Judy Currie, Bill and Connie Dean, Garry Dischel, Nelson and Carolyn Disco, Al and Jean Donaldson, Al and Betty Drake, Tom and Judith Dwyer, Marty Forsberg, John and Jane Fredericks, Harry and Mary Ann Gildea, Alan and Phyllis Godes, Bob and Joann Green, Jim Havender, Bob and Marilyn Heitman, Woody and Penny Higgins, Harry and Anne Johnson, Mal and Jill Jones, Koe Kobus, Al and Josephine Kotliar, Bob

and Nancy Kyser, Hugo and Barbara Liepmann, Milt and Letitia Little, Bill and Doris Linko, Bob and Joan Mahorter, John and Carol Marsland, Jr., Alan May, Gerson and Mimi Meyers, Mike and Astrid Myers, Bill and Ellie Noz, Jr., Leslie and Madeleine Orloff, John and Carol-Ann Pacinda, John and Toni Rinde, Ed and Nancy Roberts, Don Roellke, Morton and Barbara Rosenstein, Bob and Rosalie Rosin, Tony and Lesley Ryan, Jack and Susan Safirstein, Harry and Eleanor Salesky, Bill Salmon, Hank and Susan Salzhauser, Howard Schumacher, Ed Schumann, Bill and Patricia Thompson, Bob and Judy Walter, and Barney and Sandra Weinstein.

Now for some news. **Jay Bonnar** has been appointed Research Administrator of Anaconda American Brass Company. He will make his headquarters at the company's Research Center, Waterbury. Jay joined Anaconda American Brass Company as a development engineer in 1962. From 1958 to 1960 he completed his military service as officer in charge, aircraft maintenance training, at Plattsburgh Air Force Base, Plattsburgh, N.Y. He obtained the rank of U.S.A.F. captain with the Strategic Air Command. Following his service Jay returned to M.I.T. and received his master of science degree in industrial management from the Sloan School of Management. While studying for this degree he was selected to participate in M.I.T.'s summer management internship program sponsored jointly with the Boston Chapter of the Young President's organization. Jay is a member of the New Haven Chapter of the American Society for Metals and Technical Association of the Pulp and Paper Industry. He is also governor-at-large of the New Haven Country M.I.T. Club and is a past president. He is presently serving as a member of the M.I.T. Educational Council. He has been active in the United Council and Fund of Greater Waterbury Chapter of the Planned Parenthood League of Connecticut. He is a member of the Watertown Golf Club, Acoaxet Club of Westport Harbor, Mass. He and his wife, the former Carol Rossiter, have three children. . . . **Harry B. Duane** was elected a Norton Company Vice President and appointed Director of International Operations. Norton has 21 plants located in 17 countries outside the United States. Harry began his Norton Company career in 1957 as a member of the controller's staff. He received successive assignments in the Cost Department and in 1959 was named controller of the firm's Refractories Division. In 1964 he became controller of the Abrasive Division. Harry was appointed managing director of Mole Norton in January of 1965. This is the Company's plant in Milan, Italy. He returned to Worcester, Mass., in September 1966 as Vice President and Controller of Norton International Inc. Harry is a member of the National Association of Accountants; St. Luke's Episcopal Church, Worcester; the M.I.T. Club of Central Massachusetts, president 1964-65; Alumni Council,

M.I.T.; and the Vineyard Haven Yacht Club. He is married to the former Natalie C. Dickinson of Waban, Mass. They have a daughter and two sons.

A brief note from **Stanley Segall**. He advises us that after 10 years working in the food industry he has now opened his own office in Philadelphia consulting in the food processing, equipment and service field. . . . **Bob West** is now in private practice of architecture specializing in high-rise apartments and motels. He is married and has four sons. . . . **Frank Mitchell** is presently located in Roanoke, Va., as sales engineer with the Industry Control Department of General Electric. He is involved in the sales of electrical control equipment for shipboard use by the U.S. Navy and merchant marines and of engine room automation equipment for foreign built ships. He comments that he would love to see anyone who gets by, complaining that there aren't many M.I.T. folks in "these here" hills. . . . That is all for now; more news next month. How about some letters.—**Fred L. Morefield**, Secretary, 18 Whaddon House, William Mews, London S.W.1.

58

Received a letter from **Paul Padgett** who is already a victim of 'Reunion Fever': "I enjoy reading the alumni column very much and thought I might drop a line myself. Nancy and I just celebrated our 12th wedding anniversary recently and have been living in Cincinnati for the last nine years. I forsook engineering completely in 1962 after four years at Procter and Gamble to go into the used car business and have been very fortunate in establishing my business successfully here. I get a lot of cracks about M.I.T. and used cars, but to my surprise I have met three alumni here in Cincinnati alone who are in the car business, and all of us are doing well. The cliché-moral being, I suppose, that regardless of the type of business a little stiff training in the disciplines sure isn't going to hurt you. Frankly, I would like to hear about more M.I.T. graduates who strayed from beaten paths and made a go of it. I bet we could come up with some real dillies. Any M.I.T. morticians? A few classmates may remember my intense interest in jazz and the amount of time I spent with the M.I.T. Jazz Society (instead of my studies, and had it not been for **Les Sodickson** I'm sure I'd never have made it) and I have often wondered if the Society continued, although in today's hip age it might seem redundant. In any event the music library is going to have to suffer through a donation of my immense collection of musty records which I will bring to our 10th Reunion, the real motive here not being charity but closet space. Anybody for Thelonious Monk?"

Stan Fenster is now employed as a Senior Project Engineer at General Precision, Inc., Kearfott Systems Division, in Wayne,

N.J. Stan resides with his wife and three children in Parsippany, N.J. He received his M.S. from the University of Pennsylvania in 1965. . . . **James French** is employed at Jet Propulsion Laboratory in the system test and launch operations section on the Mariner program. Jim and his wife Sharlyn are living in Monterey Park, Calif. . . . **David Vahlsing** is with the Sun Oil Company in Philadelphia and has had several articles published recently, including this one on "Once-Through vs. Cooling Tower Water" in *Hydrocarbon Processing*, July 1967. . . . Another author is **Gene Ott** with an article in the *IEEE Transactions on Information Theory*. Incidentally, he followed up his S.M. at M.I.T. in electrical engineering with an M.A. and Ph.D. in applied discrete mathematics from Harvard in 1965 and 1966 respectively. . . . **Albert Brand** is working for the Litcom Division of Litton Systems in Pleasantville, N.Y. He and his wife, the former Adeline Garnsey of Schuylerville, N.Y., now have two children, Andrea 4 and Albert 1. They are busy building a new home in Briarcliff Manor.

A letter from **John Boynton** tells us that, "I now hold a very interesting position with NASA as a technical staff assistant to Christopher Kraft, Director of Flight Operations in Houston, Texas. Am doing a great deal of private flying now and hope to soon visit old school friends and attend our Class Reunion." . . . We're really pleased that so many of you are planning on the Reunion. Let's make this a big year for 1958. Communicate!(news) Participate!(dues) Rejuvenate!(reunion). Meanwhile our very best wishes for a merry holiday and Christmas season for you and your family.—**Michael E. Brose**, Secretary, 1171 North Street, Walpole, Mass.; **Antonia D. Schuman**, Western Associate, 22400 Napa Street, Canoga Park, Calif.

61

Gus Solomons, Jr., spent the summer on a pilot eight-week modern dance course for teenagers in New Britain, Conn. According to the *Hartford Times* Gus is "not only a distinguished dancer, but is a noted choreographer and teacher as well." The course was set up by the Office of Economic Opportunity for low income children. Later in the summer he danced in New York receiving interest and praise from the *New York Times*. In part they said, "Audiences being what they are will naturally cough, whisper, shuffle and rustle their programs throughout any performance. Wednesday night in a Dance Theater Workshop concert . . . Gus Solomons, Jr., did not request silence but only that the audience do what comes naturally, as accompaniment to his dance *Kinesia* #5. And it did . . . With a performer as precise as Mr. Solomons no other [accompaniment] was needed; it was engrossing to watch the movements and permutations." M.I.T. man makes good! . . . Another M.I.T. man

making good is **Jim Keller**. He is now Assistant Professor of Philosophy (he was Course XXI-B) at MacMurray College in Jacksonville, Ill. Jim's qualifications make impressive reading. After leaving the banks of the Charles he was a Woodrow Wilson Fellow at the Pittsburg Theological Seminary where he got a B.D. (Divinity) in 1962. Then he became Presbyterian Graduate Fellow at Yale. That fellowship running out he became a Yale University Fellow. Not satisfied with that he finally was a Rockefeller Doctoral Fellow. I suppose that he finally left when they ran out of fellowships. He did end up with a Ph.D. Gus and Jim prove that you don't need a slip stick in your hand to make it.

C. Anthony Junker kept the slip stick and has joined with one Mark Ueland to form the architecture firm of Ueland and Junker. They are at 34 South 17th Street in Philadelphia. . . . **Akram El Amin** joins the brain drain and writes, "I wonder how many overseas alumni come back to work in the U.S.A. I have had very useful experience and learned quite a bit since my latest arrival two years ago." . . . **Walter Jackson, Jr.**, is an Assistant Project Engineer with the consulting foundation engineering firm of Woodward-Clyde-Sherard and Associates in New York City. . . . **E. Viet Howard** has two kids: Gail just over 2 years old and Randy about a year and a half. He (daddy, that is) works for Kennecott Copper Corporation doing hydrometallurgical research. . . . **Peter Gaposhkin** has piled up a number of degrees in the last couple of years. They all come from Berkeley. He started off with an M.A. in astronomy in 1965. As an encore came the M.A. in

physics about a year ago. Now, as a grand finale he is on his way to a Ph.D. in physics, expected in about a year. . . . **Jerome York** got an M.B.A. from the University of Michigan in 1966 and now works for GM at the Pontiac Motor Division in Pontiac. . . . **Kenneth Blanchard** got a Ph.D. from Princeton last June, his in chemistry. . . . **John Castle** sends the pertinent data: three kids, Michael 2, Philip 3 and "x" 6 months. Employment: Project Engineer at Procter and Gamble in Cincinnati. He says he built a house in December 1965 on Blossomhill Lane in Cincinnati. Sounds lovely.

William Dyer is in the Air Force. He earned his M.D. from Washington University in St. Louis in 1965, served an internship and they grabbed him. He is at McClellan A.F.B. in California where he is in the Air Defense Command. . . . **Richard Resch** was appointed Vice President of Manufacturing at Krueger Metal Products Company in Green Bay. Richard has an M.B.A. from Harvard (1963) and has been at Krueger (which is the largest manufacturer of folding seating in the country) since 1964. . . . **Kenneth MacCoul** left M.I.T. and moved to the Tufts Medical School getting his M.D. in '65. There followed an internship at Mt. Auburn Hospital in Cambridge for two years. During that span he also tended wounds for the Harvard football and rugby teams. With that finished he went to Stanford in Palo Alto where he is now on a three-year appointment in eye surgery. . . . The February number of the *Bell System Technical Journal* published a hefty article by **John Savage** entitled "Some Simple Self-Synchronizing Digital Scramblers." As you might guess



William S. Widnall, '59, of the M.I.T. Instrumentation Laboratory is the new International One-Design Sailing Champion of the world. He and four members of his crew—Robert Crisp, Pieter R. Mimno, '58, and Robert F. Morse, '62, of the Instrumentation Laboratory, and Mrs. Sheila Evans Widnall, '60, who is Assistant Professor of Aeronautics and Astronautics at M.I.T.—brought the trophy home from Norway to the Corinthian Yacht Club in Marblehead during the summer.

John's specialty at Bell Labs is coding and information theory. He is also a lecturer in E.E. at Columbia University. . . . **Kenneth Chapman** started work last June in a new American Chemical Society position administering ACS programs related to various aspects of chemical education in two-year institutions. . . . Well that pretty much clears off the desk. Keep getting degrees, children, wives and jobs and then let us know. Merry Christmas, Chanukah and New Year.—**Andrew Braun**, 131 Freeman Street, Brookline, Mass. 02146

62

Having missed the November issue due to an overload of work on my project, my mailbox is now more full than it has been for several years. The first order of business is to mention the wonderful time that the following people had at our first reunion at the White Cliffs in June: Jerry Adams, Bill Bloebaum, J. Baxter Clifford, Jr., Herschel Clopper and wife Phyllis, John L. Costello and wife Lawrence, Keith Ferguson, R. G. Helmig and wife Nancy, Larry Hoffman and wife Esta, Peter Hoffman and wife Ronda, Phil Hudock, Leland Jackson, Jerry Katell and wife Linda, Bill Koch, David Koch, Ed Linde and wife Joyce, Robin Lytle, Anthony Mack and wife Dolores, Bill Mihalts, Ed Myskowski and wife Regina, Dave Nickles, Joe Perkell, John E. Prussing and wife Laurel, Joseph D. Rapaport and wife Alice, Chet Riley and wife Diane, Dick Robnett and wife Lyle, Jim Ross, Murray Sachs, Bojey Salmon and wife Cindy, Art Samberg and wife Becky, K. J. Sladek and wife, Steve J. Smith and wife Becky, John Sowa, Jeff Steinfield, Bob Swaney and wife Angalee, Manny Terezakis, John V. Terry and wife Fifi, Bob Thomas and wife Lorene, B. T. Tucker, S. J. Warner and wife Judy and Bob Wilhelm.

The Reunion Committee headed by **Ed Linde** had done an excellent job of preparation, and everything worked perfectly. The dance and the "go-go" dancer on Saturday night were probably the highlights of the weekend, but not far behind were the football on the beach, croquet on the lawn and the clambake. Everyone in attendance had a great time, and we all are very thankful for the job done by the Reunion Committee. People came from as far away as California, Washington state, Illinois, Michigan, and Missouri. Naturally, we all hope that the next reunion will include even more of our classmates anxious to rekindle old friendships and have a good vacation weekend.

The following Class officers were elected: **Bojey Salmon** was re-elected Class President; **John Costello** was named Treasurer, **Steve Smith** was named Class Agent, and **Ed Linde** was named Alumni Representative. In order to reach more of the members of our Class scattered around the United States, six regional Vice Presidents were elected: **Steve J. Warner**, New England; **Robin**

Lytle, Mid-Atlantic; **Peter Hoffman**, South-Atlantic; **Richard Robnett**, North Central; **Terry Bray**, South Central; **William D. Bloebaum**, West Coast. Bojey Salmon deserves all of our appreciation for the work he has done over the past five years and for the work he is now doing in helping the regional Vice Presidents get started. I was re-elected Class Secretary. Awards were given at the Class meeting as follows: For most hair loss, won hands down by Ed Linde who was awarded a clod of grass from the "Great Court;" for greatest number of children, the **Robin Lytles**, who were awarded a toy; for most likely to get injured, **Art Samberg** received an M.I.T. sweat-shirt; for the greatest distance traveled to the Reunion, **Bill Bloebaum** who came from Anaheim, Calif.; for the man working in the company with the best name, **Tony Mack** of Sweethart Plastics received a fresh copy of the *Technology Review*; for the marriage in which the woman seems to be wearing the pants, **Terry Bray** received an ash tray; for the person working in a job farthest from what he studied in school, **Joe Rapaport**, a traveling consultant, received an entrance application for M.I.T.; and I was given the Lowell Thomas award, a copy of the book *Hawaii* in remembrance of my lengthy travelogue in lieu of Class notes. Some of these awards are probably not recorded here as they actually were awarded in June since I am trying to decipher them from some Sanskrit notes taken by **Joe Perkell**. It should be remembered for posterity that Delta Tau Delta was very ably represented by five members, which I believe was the entire 1962 graduating class. Other living groups well represented were East Campus with 7 and Sigma Alpha Mu with 4. In later issues I will give more information on some of the people who attended.

Bob Wilhelm married Donna Mona Sosinski on September 30 in Washington, D.C. They then took a European honeymoon and are now living in Bogota, Columbia, where he is Manager of the Economics and Planning Department of International Petroleum Company, an affiliate of Standard Oil of New Jersey. We all met Donna at the Reunion and wish the two of them the best of luck. Bob wrote to me and expressed the same thing that I and others who had been away from Boston for some time felt upon seeing M.I.T. on Alumni Day with regard to the tremendous changes and growth. He mentioned that he was pleasantly surprised to see his thesis on display in the library. . . . **Bill Jackson** writes from Dallas, Texas, that he and his wife Gerry adopted a baby boy born September 3, 1967, have named him Randall Paul and are grooming him for the M.I.T. Class of 1990. Bill works for Texas Instruments. . . . On a more somber note, the memorial services at the M.I.T. Chapel on Alumni Day included the names of two of our classmates reported deceased between June 1, 1966, and June 1, 1967, **David W. Beardsley** and **Barry J. Rosen**. I have no further information than that. At the Reunion **Chet Riley** told me that A.F. Lt. **Edward**

Allen Brudno has been a confirmed prisoner of war in North Vietnam since he was shot down in his F-4C Phantom and captured in 1965. He was married six months before he left for the war. Our best wishes for his safe return are with him, his wife, and his family.—**J. Katell**, Secretary, 310 Hoge Building, Seattle, Wash. 98104

63

Stephen Kaufman is now with Cleveland Refractory Metals as director of all financial activities. He has also joined Cleveland's most eligible bachelor set with his new sailing ship. . . . **Don Yansen** married Lynn Watson last summer and honeymooned in Nova Scotia. **Jim Nick** came East from Seattle for the wedding and then went to Expo to stand in line for a few days. . . . **Edwin Aldrin**, Sc.D., our spacewalking pilot of Gemini 12, recently received an honorary doctor of science from Gustavus Adolphus College. . . . **Henry Gertzman** is at the University of Rochester working on his Ph.D. . . . **Mike Wolfberg** is working on a Ph.D. dissertation in computer graphics at the University of Pennsylvania. He is also the publications chairman of the Digital Equipment Users Society. . . . **Robert Fortenbaugh** married Barbara Kenney of Syracuse in July '65. He is with Grumman and recently received an M.S.E.E. from Brooklyn Polytech.

Roger Hinsicks is at the University of Washington and got married last March to Jeanne Marshall of Seattle. . . . **Richard Merrill** reports that when he is not skiing he works for Digital Equipment Corporation. . . . **Bob Morse** received his Ph.D. from Yale in June '66 and is now at U.C.S.D.-La Jolla doing research in molecular dynamics. . . . **Frank Verlot** is with Lockheed Missiles and Space and also working on his Ph.D. at Stanford. . . . **Jim Evans** is teaching E.E. at M.I.T. while working on a Ph.D. in communications biophysics. He is living with **Tom Gerrity** and **Kent Groninger**. . . . **Lew Neuman** is now Chief Engineer with the Royal Slide Fastener Company in N.Y.C. . . . **Bruce Krewinghaus** is at the Army Coating and Chemical Lab at Aberdeen Proving Ground, Md. . . . **Troy Chappell** is in Vietnam. . . . **Robert Geroch** has received one of 15 A.F. Office of Scientific Research Postdoctoral Research Awards and has finished his doctoral work at Princeton. . . . **Walter Berninger** recently received a Goodwin Medal for excellence in teaching at M.I.T. If you have any news at all, send it to—**Bob Johnson**, Secretary, 209 E. 66 St., N.Y., N.Y. 10021

64

J. A. Ball, **J. C. Carter**, **Mrs. P. Crowther**, and **A.E.E. Rogers** teamed up to produce an article in the August issue of *Science* concerning spectral line interferometry. All are members of '64. . . . **Steven Bollt** has opened his own of-

fice as an independent consultant in operations research. His first child, a boy named Erik Matthew, was born this past April. . . . **Christopher Calton** recently began a three-year management training program with General Precision, Inc. He will spend his first year in Glendale, Calif. Chris was married in June to Miss Shelley Anne Glassman of Binghamton, N.Y. . . . **Michel Delsol** is working on his Ph.D. in metallurgy at M.I.T. He was married to Miss Cheslye Larson of Wellesley this past June. . . . **James Dorr** is doing graduate work at Indiana University. . . . **Chesney Floyd** graduated from Stanford Law School this June and received a fellowship based on his scholastic achievements in the field of mineral law. He was an editor on the *Law Review*.

James Giffin has finished his work at Harvard and is now working for the Westinghouse Defense & Space Center in Falls Church, Va. He was married to Jackie Cook of Simmons in 1966. . . . **Keith Gilbert** is employed by the Watkins-Johnson Company in Palo Alto, Calif. . . . **Robert Grand** has joined the international contract research consulting firm, Arthur D. Little, Inc., where he will specialize in electronics. He received his S.M. at M.I.T. in 1965 and his M.B.A. from Harvard this past June. . . . **Richard McEntire** is working on his Ph.D. in space physics at the University of Minnesota. Dick was married last December to Miss Robin Ladd of Wellesley '66, who is now in graduate school in psychology at the University of Minnesota. . . . **Pete Ordeshook** is working on his Ph.D. in space physics at the University of Rochester. . . . **Richard Posner** reports that he never received his copy of the Alumni Directory, so hopefully this avalanche of publicity will embarrass whoever has withheld it and cause instant redress. . . . **Raymond Smith** joined the Peace Corps after graduation, as an architect in Tunisia. He is married to fellow Peace Corps volunteer Miss Cecilia Babcock of Vassar '64, and their daughter was born in Carthage while they were in the Peace Corps. Raymond is now working for a firm of architects in Austin. . . . **Phillip Townsend** is now working for Shell Chemical Company in Houston after receiving his M.S. in Ch.E. at Purdue. In his spare time he is earning credit toward an M.B.A. from the University of Houston. . . . That's it for this month. Let me hear from the rest of you.—**Ron Gilman**, Secretary, 1021 Oakmont Pl. Apt. 8, Memphis, Tenn. 38107

67

Here at Stanford I keep running into M.I.T. classmates; it's good to see so many familiar faces. Greetings from all of us! I hope that the many of you I don't see will drop me a few lines. . . . **Jack Farber** is a teaching assistant at Columbia. . . . **Richard Farrell** worked with I.B.M. during the summer and is now studying biomedical engineering at Johns Hopkins. . . . **Ruth Goldstein** and **Gene Fax** were married in August.

Gene is in graduate school at M.I.T. . . . **Richard Feiertag** is studying at M.I.T. . . . **Frank Geiger** is at Sloan. . . . **Robert Gerstle** is attending the Georgetown School of Medicine. . . . **Henry Haussling** is studying mathematics at M.I.T. . . . **John Hespeneide** is working in the Poughkeepsie Labs of I.B.M. . . . **Hisayuki Handa** is a research assistant in the M.I.T. Gas Turbine Laboratory. . . . **Larry Iceman** has an NDEA Fellowship at the University of California in San Diego. . . . **Elliot Immerman** is at the University of Maryland. . . . **Bill Ioup** is studying at Columbia. . . . **Robert Kline** has a research assistantship at the California Institute of Technology. . . . **David Kloepper** has an NSF Science Development Program Fellowship at Brooklyn Polytechnic. Dave is studying metallurgy.

Janine Knauf is a research engineer for the L.A. Division of North American. . . . **Ralph Loffredo** is at the Polytechnic Institute of Brooklyn. . . . **Andy Lemer** was married in August and is now a research assistant in civil engineering at M.I.T. . . . **Joe Levangie** is at the Harvard Business School. . . . **Don Murray** was married in September and is now an

electrical engineering teaching assistant at M.I.T. . . . **Ed Radlo** has been commissioned a second lieutenant in the U.S. Public Health Service. Ed was married in August. . . . **Stephen Rawlinson** is at the Stanford Business School. . . . **Dave Saunders** is studying biology at Johns Hopkins. . . . **Ron Scharlack** is in mechanical engineering at Stanford. . . . **Mike Schiff** has a scholarship at Sloan. . . . **Jeff Schoenwald** is at the University of Pennsylvania and is very happy single. . . . **Dave Schramm**, father of two children, is attending Caltech on a three-year National Defense Fellowship. . . . **Steve Schroeder** is a guidance and control engineer for Grumman. . . . **Herbert Schulze** is at the University of Chicago Law School. . . . **Charles Spann** is attending the University of Pittsburgh. . . . **Joel Speare** is a research assistant at M.I.T. . . . **George Starkschall** is at the Harvard Graduate School of Arts and Sciences. . . . **Robert Trunek** was married in August and is now an ensign in the U.S. Navy. . . . **Burns Woodward** is attending the Yale School of Medicine.—**Jim Swanson**, Secretary, 240 Crothers, Stanford School of Law, Stanford, Calif. 94305



M.I.T. was well represented when lacrosse teams of the San Marino Lacrosse Club and Los Angeles Lacrosse Clubs met at California Institute of Technology's field in Pasadena this summer. The players included (left to right)—back row: Edward W. Driess, '64, Peter D. Kirkwood, '66, Henry C. Sharp, Jr., '50, Bruce C. Murray, '53, Joseph R. Skendarian, '61, and C. William Carson, '52; and front row: Mitchell B. Brodtkin, '61, Richard G. Lipes, '64, Richard N. Boyd, '63, Morton J. Friedenthal, '53, and Joseph H. Jerger, '52.

Course Review

V

Edward M. Burgess, Ph.D. '62, has been promoted to the rank of Associate Professor of Chemistry at Georgia Institute of Technology. Dr. Burgess was awarded the B.S. degree in chemistry (Auburn University, Auburn, Ala.) in 1956, served as Ltjg. in the U. S. Navy, June 1956-June 1959, and entered M.I.T. as a doctoral candidate in September 1959. From June 1960 to June 1962 he was the holder of an N.S.F. Graduate Fellowship. His first appointment was as an instructor at Yale University. He transferred to Georgia Tech in late 1964.

... **Orville L. Mageli** was awarded the doctorate in organic chemistry in 1953. He received the B.A. and M.A. degrees from the University of Saskatchewan. In 1953 he joined the Lucidol Division of Wallace & Tiernan, Inc., as a research associate to become, through various promotions, the Director of Research of the Lucidol Division. Dr. Mageli is credited with several publications and patents in organic peroxides, free radical polymerization and fatty acid chemistry. Dr. Mageli has been very active in the Western New York Section of the American Chemical Society. His research at M.I.T. was under the direction of Professor Nicho'as Milas. . . . The Board of Regents of Utah State University has announced the appointment of **Richard H. Boyd**, B.S., Ohio State University 1951, Ph.D., chemistry, M.I.T. 1955, to a full professorship in the University's Department of Chemical Engineering. Dr. Boyd was employed in the Central Research Department of the Polychemicals Division of E. I. du Pont de Nemours & Co., Inc., from 1955 to 1962, when he joined the faculty at Utah State. His special responsibility will be the development of a research and teaching program in applied polymer science and materials.

Lloyd H. Shaffer, Ph.D. '49, former manager of chemical research at American Machine and Foundry, has opened an office in Stamford, Conn., as a consultant in chemistry. Dr. Shaffer came to M.I.T. in January 1943 from Princeton University where he was awarded the B.S.E. degree. At Princeton he majored in chemical engineering. . . .

Thomas L. Marple, B.A. in chemistry from Occidental College, Los Angeles, 1950 and Ph.D. in chemistry, June 1954, M.I.T., has been promoted to research associate at the Union Oil Company of California's Research Center, Brea, Calif. He has been with Union Oil since he

completed the requirements for the doctorate. . . . **Roger Eiss** has been named Associate Professor at the Oregon Graduate Center, Portland, Ore. The Center is a privately financed organization for study and research for graduate students only. Dr. Eiss was awarded the B.S. (1958) and M.S. (1964) degrees from Alfred University. From 1959-1964 he was a research chemist with A.M.F., Harrisburg, Pa., studying organic semiconductors. He entered M.I.T. in the fall of 1964 and was awarded the doctorate in inorganic chemistry in 1967. Dr. Eiss was the holder of the Union Carbide Corporation Fellowship 1965-66 and of a National Science Foundation Graduate Fellowship for 12 months, 1966-67. His duties at the Center will be to establish a laboratory with x-ray and optical equipment for the study of structure in both inorganic and organic materials.

G. Doyle Daves, Jr., has been named an Assistant Professor of organic chemistry at the Oregon Graduate Center. For the past two years he has been a post-doctoral research associate with Dr. Karl Folkes, the President of the Stanford University Research Center, Menlo Park, Calif. Dr. Daves is a graduate of Arizona State University, B.S. '59, and was awarded the doctorate at M.I.T. in 1964. He also attended New Mexico Highlands University 1955-57. At M.I.T. he held a National Institutes of Health Fellowship from 1962 to 1964. At the Center he will establish a laboratory and research program for graduate students in synthesis of compounds having potential biochemical and medicinal importance. . . . **Sharon L. Johnson**, Ph.D. '59, has been named Assistant Professor in the Department of Biochemistry in the School of Medicine at the University of Pittsburgh. Sharon was awarded the B.S. degree, Iowa State College, in 1955. On graduation she accepted an appointment at the Mellon Institute and transferred to her present position from Westinghouse, Pittsburgh. . . . **Elbert C. Herrick**, Ph.D. '49, has been named Director of Chemical Research at Escambia Chemical Company, Wilton, Conn. He was awarded the B.S. degree in chemical engineering, Montana State College 1941, attended Princeton University 1941-1942 and was commissioned in the Army after attending the Meteorology School at M.I.T. in 1942-43. He entered M.I.T. as a candidate for the doctorate in February 1946. From November 1924 to December 1945 he served with the Air Force in the American and European Theaters, was decorated for meritorious service and

awarded the ETO ribbon with five battle participation stars.

The following were awarded advanced degrees in chemistry in September 1967. Doctorates in inorganic chemistry: Roger L. Eiss, B.S. 1958, M.S. 1964 Alfred College; Jaan Laane, B.S. 1964, University of Illinois; David C. Richardson, B.A. 1926, Swarthmore. . . . Doctorates in nuclear chemistry: Bahman Parsa, B.S. 1963, University of California at Berkeley; Richard C. Ragaini, A.B. 1963, Clark University. . . . Doctorates in organic chemistry: Robert D. Bach, B.A. 1962, M.S. 1964, University of Delaware; John C. Blankley, B. S. 1963, Stanford University; Richard D. Cramer, 3d, B.A. 1693, Harvard College; Charles M. Deber, B.S. 1962, Polytechnic Institute of Brooklyn; Gerald L. Goe, B.S. 1963, University of Missouri; Stan S. Hall, B.S. 1963, University of Wisconsin; George A. Knudsen, B.S. 1963, University of Maryland; Jerry K. Larson, B.A. 1963, Macalaster College; Michael G. McGrath, B.S. 1963, College of the Holy Cross; Jose F. Pazos, B.S. 1963, the University of Puerto Rico. . . . Doctorates in physical chemistry: Michael C. Fowler, B.S. 1963, Yale University; George O. Neely, B.S. 1963, Davidson College. . . . S.M. degree in nuclear chemistry: James L. Fasching, B.S. 1964, North Dakota State University. Of the doctoral candidates, five accepted assistant professorships, three temporary research associateships in chemistry at M.I.T., five accepted industrial positions. One was employed in a government research laboratory, three postdoctoral appointments elsewhere. The master's candidate will continue at M.I.T. as a candidate for the doctorate in nuclear chemistry.—**Leicester F. Hamilton**, Correspondent, M.I.T. 4-254, Cambridge, Mass. 02139

VI

Philip K. Baltzer, S.M. '55, formerly with the RCA Laboratories staff in Princeton, has been chosen to head a new 12,000-square-foot research center which RCA has opened in Tokyo, Japan. This new facility is an expansion of a research activity founded by RCA in 1961 to foster closer relations between the Japanese and American scientific communities. The present staff comprises 30 Japanese scientists, technicians and administrative personnel who will concentrate on investigations of magnetic materials, semiconductors and semimetals, plasma physics and communications theory. Dr. Baltzer received the

S.B. degree from Northeastern University and the doctorate from Rutgers. His address is Laboratories RCA, Inc., Central P. O. Box 219, Tokyo, Japan. . . . **Frank G. Kear**, S.M.'28, Sc.D.'33, as President of the Lehigh University Alumni Association, addressed the annual meeting of that body in June on "Blueprints for Tomorrow," according to the *Lehigh Alumni Bulletin*. After stressing the importance of giving annually to the Alumni Fund and of steering good secondary school prospects toward the University, he proposed an alumni attack on the post baccalaureate education problem. In order to keep the alumni up to date, he foresaw the possibility of traveling classrooms with textbooks, lectures, and lecturers moving out from the University to the various city centers, sponsored by the local alumni clubs. Dr. Kear's undergraduate work at Lehigh was in electrical engineering, and he held an instructorship while pursuing his graduate work at M.I.T.

Byron L. Johnson, S.M.'60, has been elected General Manager of the newly organized High Voltage Power Corporation in Burlington, Mass., of which **John G. Trump**, Sc.D.'33, is President. Mr. Johnson was research assistant in Dr. Trump's High Voltage Research Laboratory at M.I.T. while pursuing his graduate studies, and in 1961 joined High Voltage Engineering Corporation of which the new company is a subsidiary. Dr. Trump has had a lively interest in the generation and transmission of power since his student days, and he is now giving renewed emphasis

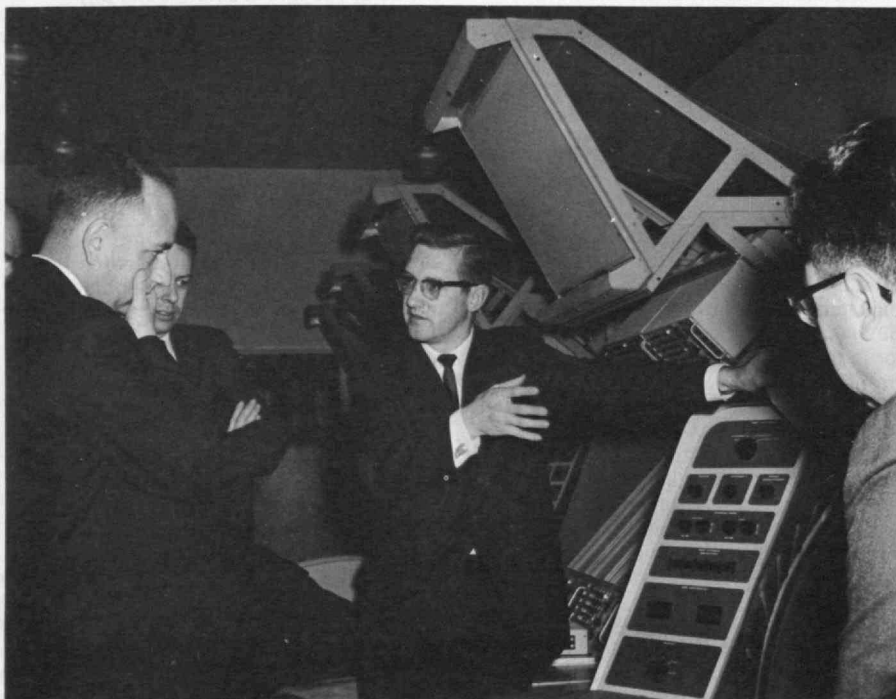
to this interest in the formation of the new company. M.I.T.'s High Voltage Research Laboratory has received a grant-in-aid from the Edison Electric Institute to conduct research on the application of compressed gas as insulation for extra-high-voltage transmission cables. . . . **Charles E. Eifler**, S.M.'48, Major General in the United States Army, was appointed early in the summer as Commanding General of the U. S. Army Missile Command at Redstone Arsenal. This Command is responsible for all phases of research, development, and production of guided missiles and employs roughly 1,000 military personnel and 10,000 civilians. General Eifler was heading the First Logistical Command in Vietnam at the time of the news release and was not expected to assume his new responsibilities at Redstone until late summer. After graduation from Pennsylvania State University in 1936, he served with ground forces in Europe in World War II. He became commanding officer of the 57th Ordnance Group in Germany before his first assignment to Redstone in 1959 as commander of the Guided Missile School.

Robert W. Beatty, S.M.'43, was a guest editor of the first special issue of the *IEEE Proceedings* (June 1967) devoted exclusively to radio-frequency measurements. The frequencies extend from 30 kHz into the laser region. Since 1948 he has been associated with the National Bureau of Standards, from 1955 to 1963 as chief of the Microwave Circuit Standards Section at Boulder, Colo., and now as consultant in the

Radio Standards Laboratories Engineering Division. He received the Department of Commerce Silver Medal in 1963 and was editor of the *IEEE Transactions on Microwave Theory and Techniques* 1963-65. His undergraduate work was done at George Washington University. . . . **James L. Sitomer**, S.M.'61, has joined Dynamics Research Corporation, Stoneham, Mass., as Manager of the System Instrumentation Department. He was formerly deputy associate director of the Fleet Ballistic Missile Program at the M.I.T. Instrumentation Laboratory. He received the B.E.E. degree from City College of New York in 1959.—**Karl L. Wildes**, Correspondent, Room 4-232, M.I.T., Cambridge, Mass. 02139

XIII-A

As the Department of Naval Architecture and Marine Engineering moves more strongly in the direction of ocean engineering, we note that many XIII-A graduates are already very active in the field. The so-called "Salvage Navy" is managed by naval officers, almost all of whom are XIII-A graduates. The Supervisor of Salvage, U.S. Navy, is Captain **Bill Searle**, Nav.E.'52. The Supervisor of Salvage is assigned to administer the Secretary of the Navy's statutory responsibilities for maintaining a viable national ship salvage and rescue posture. He is also in charge of technical and logistic support to Fleet salvage and diving forces. . . . Commander **Gene Mitchell**, Nav. E.'52, has for the past three years been Fleet Salvage Officer, U.S. Pacific Fleet, with headquarters in Pearl Harbor. He was relieved in June by Commander **John Orem**, Nav. E.'58, who for the past year has been in charge of all salvage work in the Far East and in Vietnam. Commander Mitchell returned to Washington where he



Shown during a tour of MITRE Corporation's Atlantic City Aircraft Simulation Facility are Robert R. Everett, VI, S.M.'43, Vice President—Technical Operations; David Bailey, '49, S.B. S.M.; and J. Paul Locher, 3d, VI, S.M.'43, new System Test and Design Verification Department Head.



Technology Review hereby extends its apologies to Emmett H. Bradley, S.M.'50 (VI) and George B. Stone, S.M.'58 (Sloan Fellow). The Picture above, published in the October/November issue on page 138, was said to be of Mr. Stone, who has just been appointed General Manager of Pfizer Laboratories. It is in fact of Mr. Bradley, named President of Atlantic Research Corporation.

is now assigned as Deputy Supervisor of Salvage and Officer-in-Charge, U.S. Navy Experimental Diving Unit. . . . Lieutenant Commander **O. H. Porter**, Nav. E.'66, is a program manager at the U.S. Navy Ship Research and Development Center where he is associated with Deep Submergence Systems projects. Additionally, he recently returned from duties in South Vietnam where he acted as Resident Naval Architect on a major salvage job in the Mekong Delta. Lieutenant Commander **John L. Ulrich**, Nav. E.'64, currently stationed at the U.S. Navy Boiler and Turbine Laboratory, was also assigned temporary duty as a Lift Master and Salvage Engineer on this job which involved the raising and refloating of the world's second largest suction dredge. The dredge had been sunk by enemy action. The entire salvage operation was carried out in a hostile area.

Ed Arentzen, S.M. '43, joined the advance engineering and project design department at the Quincy Division of General Dynamics last spring. Prior to this new job Ed was Administrative Officer of the Physics Department at M.I.T. for five years and was a former Professor of Naval Construction and XIII-A Registration Officer. He and Marcia continue to live in Belmont from which point of vantage Ed commutes to Quincy and the Winchester Country Club and daughter Karen commutes to Boston University where she expects to complete her B.S. requirements this fall. . . . Commander **J. H. Boyd, Jr.**, Naval Engineer '59, after spending nearly five years in ship salvage, first as Salvage Officer, Ship Repair Facility, Guam, and then as Seventh Fleet Salvage Officer, is currently Fleet Salvage Officer, U.S. Atlantic Fleet, stationed in Norfolk. At the recent American Society of Naval Engineers meeting in Washington, Boyd was presented with the Society's Gold Medal awarded annually for exceptionally outstanding contributions to the field of Naval Engineering. The citation accompanying the medal concluded with these words: ". . . By successfully combining a Naval Engineering/Naval Architecture background with the practical aspects of stability, seamanship, diving and rigging, Lieutenant Commander Boyd through his technical ingenuity and leadership has made an outstanding contribution to ship salvage and the field of Naval Engineering." . . . **William C. Gibson**, Naval Engineer '51, recently joined the staff of TRACOR, Inc., as an engineer/scientist assigned to the Company's Sonar Projects Office in Washington, D. C. Bill retired from the Navy in 1964 as a Commander. Prior to retirement he served the Director of the Special Projects Office and the Chief of the Bureau of Ships as a shipbuilding assistant for the Polaris weapon system project.

Captain **Charles N. Payne**, S.M.'48, is currently attending the fall session of the Advanced Management Program at Harvard Business School. Captain Payne is currently Comptroller and Executive Director for Programs in the

Naval Ship Systems Command. . . . Rear Admiral **C. J. Palmer**, S.M.'37, has joined the Advanced Engineering Department of the Quincy Division, General Dynamics Corporation. Prior to joining Quincy, Charlie was director of production and facilities planning for Litton Industries and a consultant to the National Science Foundation. . . . **Louise H. Roddis**, S.M.'44, delivered a paper entitled "The Industrial Future of Power Reactors" at the June meeting of the Health Physics Society. Lou is currently President, Pennsylvania Electric Company, Johnstown, Pa. . . . A note from Sao Paulo, Brazil, tells us that **Roberto Fiuza De Oliveira**, Nav. E.'59, is teaching naval construction at the University of Sao Paulo. Other chatter indicates that: Commander **Dave Flanagan**, Nav. E.'62, has made two trips to the South Pole as Chief Engineer of a Coast Guard icebreaker and is now an Assistant Professor of Mechanical Engineering at the U.S. Coast Guard Academy. Commander **Hubert Dannevik**, S.M.'48, is now Maintenance Officer, Commander Service Group One, San Diego, Calif. Rear Admiral **Floyd B. Schultz**, S.M.'37, retired from the Navy and Command of the Puget Sound Naval Shipyard in March. He is currently Works Manager for the Ingalls Shipbuilding Corporation, Pascagoula, Miss. Lieutenant Commander **Arnold Pyatt**, Nav. E.'65, is currently assigned to the Naval Repair Facility at Guam. **Paul Schultz**, S.M.'43, is currently Vice President and General Manager of Hartman-Huyer Systems Company, Huntington Station, N.Y. Lieutenant Commander **J. J. Goodwin**, Nav. E.'64, who for the past 18 months has been Salvage Master and Principal Naval Architect with Harbor Clearance Unit One in Vietnam, has moved up to relieve Commander Orem as Seventh Fleet Salvage Officer.—**Robert E. Stark**, Correspondent, M.I.T. 5-317, Cambridge, Mass. 02139



John F. Jacobs, VI, S.M.'52, has been named Vice President—Bedford Operations of MITRE Corporation. He is shown in the picture (right) with James R. Killian, Jr., '26 (center), Chairman of MITRE's Board of Trustees, and John L. McClucas, President of the MITRE Corporation, between sessions of the annual Board of Trustees meeting in Bedford, Mass.



Theodore W. Schwenke, XV, S.M.'60

XV

Sidney W. Carter, S.M.'58, formerly with International Minerals and Chemicals Corporation, has joined the Agricultural Chemicals Division of Mobil Chemical as Vice President—Florida Operations. He will direct the company's extensive mining operations and a large plant at Nichols, Fla., the division headquarters for the manufacture of phosphate fertilizer products.

Arthur J. Seiler, S.M. '32, has added another to the list of letterheads he can use: President and Chairman of the Board of the Bunting Company, Philadelphia furniture manufacturers. He is also President and Director of Lamont gear Company and of Irv-Art Realty, Inc., of Philadelphia, and of Wilmington Realty Company and Wilmington Industrial Park, both of Wilmington, Del. In addition, he is Chairman of the Board of Alloy Surfaces Company Inc., of Wilmington, and a Director of Reeves Industries, Inc., New York; Gasalloy Steel Corporation, Elyria, Ohio; and Bergen Wire Rope Company, Lodi, N.J.

Having participated in many executive decisions of Aladdin Industries, Inc., during the past 20 years as Contoller, **Frederick W. Hinton**, S.B. '36, has been elected the company's Treasurer and Assistant Secretary. He is currently President of the Nashville Chapter of the Financial Executives Institute.

ARCON Corporation, Wakefield, Mass., has announced the appointment of Senior Scientist, **Theodore W. Schwenke**, S.M.'60, to its staff. According to ARCON President, Carl Friedman, "Mr. Schwenke's experience in the design of instrumentation systems for the measurement of atmospheric fallout from nuclear weapons will increase the Corporation's capability in this broadening field." He is a member of the Operations Research Society of America and is currently completing a Ph.D. at the M.I.T. Sloan School of Management.

Sloan Fellows

Edward C. Gustely, '63, has moved from Aerojet General Corporation to become Assistant Manager of Quality Control for Kaiser Aluminum and Chemical Corporation in Oakland, Calif.

American Electric Power Service Corporation has given new assignments to two Sloan Fellows: **Conrad F. DeSieno**, '60, has been promoted to the post of Chief Planning Engineer—regional Power Supply, and **John G. Howard**, '57, has been named Assistant Vice President. Mr. DeSieno was formerly the company's Associate Chief System Planning Engineer and before 1966 was in charge of regional planning for the System Planning and Analysis Division. Mr. Howard continues to head the Rate and Sales Engineering Division of the Commercial Department, an assignment he has held since 1965. A.E.P. Service Corporation is the management and technology arm of the American Electric Power System, the nation's largest investor-owned producer of electric energy.

Joseph Fernandez, '66, has settled in Cambridge as Chief of the Management Support Division in the N.A.S.A. Electronics Research Center.

Harrison T. Price, '55, Plant Manager, Chevrolet Division, Livonia Spring and Bumper Plant, General Motors Corporation, was one of five alumni honored by Tri-State College during a reunion at Angola, Ind. The Distinguished Alumni Award for 1967, presented to him by Tri-State President Dr. Richard M. Bateman, honored Price as an "industrialist, business executive, active worker in community affairs, public servant." Price joined the Chevrolet Division of General Motors in 1948. He was President of the Sloan Fellows.

Thomas E. Salisbury, '56, has been appointed Executive Vice President of the Firestone Synthetic Rubber & Latex Company. He joined Firestone in 1949, has served the Synthetic Division as a process control engineer and assistant chief chemist, supervised export sales of synthetic rubber, latex and chemicals for the International Company, and since 1960 has been General Manager of the Synthetic Rubber & Latex Division of Firestone—France located at Port Jerome, France.

For the third consecutive year **Lincoln A. Divoll**, '59, was named to head a department for the Providence, R.I., United Fund drive which directs company campaigns as pace setters before the general campaign. General Manager, Rhode Island, New England Telephone Company, Divoll is also First Vice President of the Greater Providence Chamber of Commerce and Chairman of the 1967 Share in Freedom campaign. He has been active in the Narragansett Council, Boy Scouts of America, the Urban League of Rhode Island, and the Pawtucket Y.M.C.A.

SPECIAL REDUCED RATES FOR M.I.T. ALUMNI

FOURTH ANNUAL TOUR PROGRAM-1968



These tours are based on special reduced air fares which offer savings of hundreds of dollars on air travel. For example, the tour to India is based on a special fare, available only to groups and only in conjunction with a tour, which is almost \$400 less than the regular air fare. Special rates have also been obtained from hotels and sightseeing companies. Air travel is on regularly scheduled jet flights of major airlines such as Japan Air Lines and B.O.A.C.

The tour program covers two areas—the Orient and India—where those who might otherwise prefer to travel independently will find it advantageous to travel with a group. The itineraries have been carefully constructed to combine the freedom of individual travel with the convenience and savings of group travel. There is an avoidance of unnecessary regimentation and an emphasis on leisure time, while a comprehensive program of sightseeing ensures a visit to all major points of interest. Hotel reservations are made as much as a year and a half in advance to ensure the finest in accommodations.

In past years, separate tours have been offered for Harvard and Yale alumni. Air fare regulations for 1968 will permit intermingling of alumni on any tour, and the full program is being offered to alumni of Harvard, Yale, Princeton and M.I.T., making possible a wider choice of departure dates.

THE ORIENT

30 DAYS \$1499

Mar. 23-Apr. 21

Jun. 29-Jul. 28

Sept. 21-Oct. 20

The fourth consecutive year of operation for this fine tour, which offers the true highlights of the Orient at a sensible and realistic pace. Eleven days will be spent in JAPAN, divided between TOKYO, the ancient "classical" city of KYOTO, and the FUJI-HAKONE NATIONAL PARK. Five days will be spent in HONG KONG and four in the fascinating city of BANGKOK. Shorter visits to SINGAPORE and the lovely island of FORMOSA complete the itinerary. Optional pre and post tour stops may be made in Honolulu and the West coast at no additional air fare.

A complete program of sightseeing will include all major points of scenic, cultural and historic interest. Among the many features will be: a tour of the canals and floating markets of Bangkok with breakfast at a waterside restaurant; an authentic Javanese "Rijsttafel" in Singapore; a launch tour of Hong Kong harbor at sunset, with dinner at a floating restaurant; visits to the Toroko Gorge and the new National Palace Museum in Taipei; a trip on the ultra-modern 125 m.p.h. express train in Japan,

as well as comprehensive tours of the cultural treasures of Kyoto, full day excursions to Nara and Nikko, and other programs, all fully described in the tour brochure.

Tour dates have been chosen to coincide with special seasonal attractions in Japan: the spring cherry blossoms and beautiful autumn leaves (Tours 1 and 3) and the famous Gion Festival in Kyoto, probably the most colorful and historic pageant in the Orient (Tour 2). Total cost is \$1499 from California, \$1699 from Chicago, \$1737 from New York and \$1747 from Boston.*

INDIA

Including NEPAL and PERSIA

29 DAYS \$1549

Oct. 5-Nov. 2

This tour presents an unusual opportunity to see the splendidly diverse and fascinating subcontinent of India, together with the once-forbidden kingdom of Nepal and the rarely-seen splendors of ancient and medieval Persia. Here is India from the mighty Himalayas to the palm-fringed Bay of Bengal: BOMBAY, the great seaport and traditional "gateway to India"; the magnificent cave temples of AJANTA and ELLORA, whose thousand year old frescoes are among the outstanding achievements of Indian art; MADRAS, in the south, closely associated with Elihu Yale; the great industrial city of CALCUTTA; then a thrilling flight into the Himalayas to KATHMANDU, capital of the kingdom of NEPAL, where ancient palaces and temples abound in a land still relatively untouched by modern civilization; the holy city of BENARES on the sacred river Ganges; AGRA, with time to see not only the Taj Mahal but many other celebrated monuments of the Moghul period such as the great Agra Fort and the fabulous deserted city of Fatehpur Sikri; the walled "pink city" of JAIPUR and nearby Amber Fort; the unique hill city of UDAPUR, noted for scenic lakes, gardens, and delicate white marble palaces; NEW DELHI, the great capital of the nation; followed by a restful stay in the fabled beauty of the VALE OF KASHMIR, surrounded by the snow-clad Himalayas. After India comes exotic PERSIA (Iran): hundreds of miles to the south of Teheran lie PERSEPOLIS, the great royal capital of Darius and Xerxes in the 5th century B.C.; and ISFAHAN, the fabled capital of Persia in the 15th-17th century Renaissance, with its palaces, gardens, bazaar, and justly famous tiled mosques.

Transportation is by air, motorcoach, motorlaunch and elephant. Outstanding accommodations include luxurious houseboats on Dal Lake in Kashmir and hotels that once were palaces of Maharajas. Total cost is \$1549 from New York.*





***Special rates from other cities. Tour cost includes:**

Jet Air, Deluxe Hotels, Meals, Sightseeing, Transfers, Tips and Taxes.

For	Alumni Flights Abroad
Full	P. O. Box 99
Details	Lenox Hill Station
Contact:	New York, N. Y. 10021

WHEN SHOPPING STARTS TO GET ON YOUR NERVES...

COUNT UP TO SIX!

S	M	T	W	T	F	S
			1	2	3	the 6th day
5	6	7	8	9	10	
12	13	14	15	16	17	
19	20	21	22	23	24	
26	27	28	29	30	31	

THE 6th DAY IS YOUR DAY AT THE COOP

Saturday is a day of rest and relaxation — a perfect day to do your holiday shopping at the Tech Coop. There's no driving around the block looking for a parking space, no people crowding you, no lack of time. Saturday is a special day at the Tech Coop.

Customers can park in any of three locations absolutely free: The multi-decked West Garage on Vassar or the parking lots behind Kresge Auditorium and Rockwell cage . . . just a few steps away from the Tech Coop.

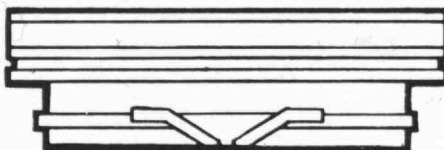
The Sixth Day is the day to shop in uncrowded surroundings with time to appreciate the Coop's pleasant atmosphere. Notice the wide carpeted aisles, soft lighting, artistically displayed merchandise. At the Tech Coop, you'll find everything to fill your shopping needs in one scientifically arranged floor.

The Sixth Day is a day for browsing through the Tech Coop's spacious departments. Flip through the latest in paperback and hardbound books. Take a look at the here and now of men's fashions. Buy a gift for your lady. The Sixth Day is the Coop's way of offering you a rewarding and enjoyable Saturday afternoon.

84 Massachusetts Avenue, Cambridge, Mass. 02139

Regular Hours: 8:50 - 5:30 PM, Mon. - Fri.

Sat. 9:20 - 6 PM



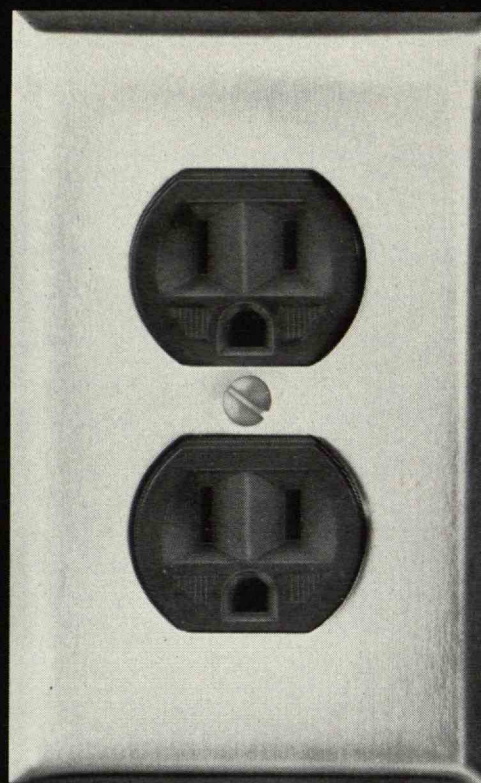
THE TECH COOP

Free Parking . . .

On Saturdays at 3 spacious Parking areas adjacent to the Student Center.



Do your problems start here?



Line-voltage variations are seldom blamed for the insidious little problems that plague us daily. Usually we blame the equipment. So, as a public service to protect electrical equipment from kicks, fists, cuss words, and other abuses, we would like to list a number of troubles that are directly attributable to off-normal line voltage.

Motors . . . Low voltage increases starting time, reduces starting torque (at 10% undervoltage, a squirrel-cage motor has 19% less starting torque); efficiency of portable tools such as hand grinders will drop as much as 10%. Overvoltage may stress shafts, gears and belts; with a 10% increase in line voltage, starting current is up 12%, power factor is down 5%, and motor noise increases.

Lighting . . . Low voltage reduces lamp efficiency; a 10% line drop reduces light in incandescent lamps by 30%. Tungsten-halogen lamps blacken; color temperature of photographic lamps drops by 100°K. Overvoltage reduces lamp life; a 4% increase halves the life of incandescent lamps. A 10% increase produces a 20% increase in heat of infrared lamps — enough to scorch sensitive surfaces.

Electrical Equipment . . . At 10% undervoltage unprotected thyratrons and other gas-filled tubes can fail in minutes.

Output of unregulated oscillators and generators will vary, stability will be impaired, and calibration will be questionable. Varying voltage will seriously distort the accuracy of data obtained during life testing. A 10% increase in voltage will cut tube life by 75%.

Industrial Equipment . . . At 10% undervoltage ultrasonic cleaner and induction-heater output is off 20%; plating deposition rate drops 10 to 20%; precipitator cleaning power drops 20%; solenoid holding power is reduced; electrical heating time is increased by 20 to 25%. Varying line voltage impairs weld consistency produced by energy-storage spot welders used for fabricating aluminum and exotic metals. Heat sealing processes are seriously hampered by voltage fluctuation. At 10% overvoltage, metallic rectifiers become overstressed and their ability to withstand transient surges is reduced by 50%. Idling losses in electrical distribution equipment is increased; transformer core losses increase approximately as the square of the applied voltage.

The SOLUTION . . . These and many other voltage ills can be handled simply and effectively with Variac® automatic voltage regulators. They are designed for fast (up to 80-volts-per-second correc-

tion on 115-V lines), accurate (4% or ½%), and distortionless control of line voltage. Overloads as much as 10 times rated current can be accommodated.



These all-solid-state regulators are available in 31 electrically-different models, rated at 2- to 20-kVA for industrial use and 2- to 9.2-kVA for military applications. Models are available for frequencies of 50 to 60 Hz or 30 to 450 Hz, single- or three-phase operation, nominal line voltages of 115, 230, and 480 volts. Prices start at \$530 in U.S.A.

For complete information, write General Radio Company, W. Concord, Massachusetts 01781; telephone (617) 646-0550; TWX (710) 347-1051.

GENERAL RADIO